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A CONCISE HISTORY
OF THE
INTERNATIONAL EXHIBITION
of 1862,

ITS RISE AND PROGRESS, ITS BUILDING AND FEATURES,
AND A SUMMARY OF ALL FORMER EXHIBITIONS,

BY JOHN HOLLINGSHEAD.



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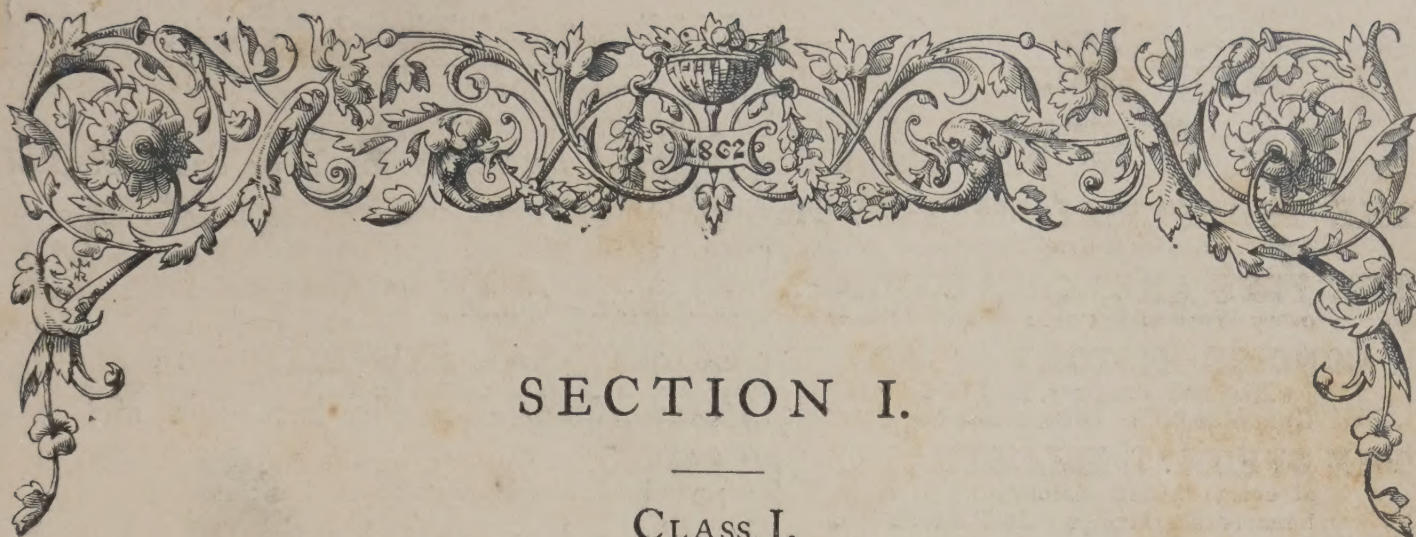
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TO

HOLLINGSHEAD'S CONCISE HISTORY.



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SECTION I.

CLASS I.

MINING, QUARRYING, METALLURGY, AND MINERAL PRODUCTS.

[1]

AARON, E. & W., *Liverpool*.—1. Halkyn hydraulic limestone. . 2. Halkyn Chirt stone.
3. Holywell Roman cement stone.

[2]

ABERDARE COAL COMPANY, *Cardiff, Glamorganshire*.—Specimens of Aberdare Company's Merthyr steam coal, from the four-feet and nine-feet seams.

The coals, raised by this company, and shipped at Cardiff, are used extensively for marine purposes by the English and French Governments, and are entered in the naval contracts of both countries. They are also very largely used, by all the great steam navigation companies in England, and on the Continent.

Evaporative power	...	...	...	15·852
Specific gravity	...	...	...	1·323
Coke	...	...	...	86·8
Moisture	...	...	...	·9
Frangibility	{ Large	...	...	86·4
	{ Small	...	...	13·6
Ash	...	...	...	1·90
Carbon	...	...	...	89·33
Hydrogen	...	...	...	4·23
Nitrogen	...	...	...	1·57
Sulphur	...	...	...	·67
Oxygen	...	...	...	1·60

[3]

ABERDARE IRON COMPANY, *Aberdare, Glamorganshire*.—Coal ; iron ore, pigs, refined metal, and railway iron.

[4]

ABERDARE STEAM FUEL COMPANY (Limited), *White Lion Court, London ; Cardiff, and Aberdare*.—Patent steam fuel.

The ABERDARE PATENT STEAM FUEL, is made by compressing the small of the best South Wales steam coal, until its density somewhat exceeds that of the coal itself. From the regular form, and uniform size of the blocks, a larger quantity by weight can be stowed in a given space, to the extent of one-third, than of the coal ; and at the same time the evaporating power is maintained ; facility in firing is in no degree diminished ; all risk of spontaneous ignition is removed ; and much

advantage is gained in convenience and cleanliness of trans-shipment, especially in foreign ports. Moreover, while coal, when stored abroad, is subject to a depreciation of from 20 to 30 per cent., this fuel is absolutely incapable of injury, even by a lengthened exposure to the full effects of tropical heat and rain. Weight, per cubic foot, 80 lbs. Space occupied by one ton, 28 cubic feet. Supplied in blocks 9 in. by 6 in. square, of 14 lbs. each.

[5]

ADAIR, JOHN G., *Bellgrove, Ballybrittas*.—Coal from exhibitor's colliery, Ballylethane, Queen's County, Ireland. Marbles, minerals, and building materials, natural productions of County Donegal, Ireland.

[6]

AYTOUN, ROBERT, *3 Fettes Row, Edinburgh*.—Safety-cage for miners, and hoist.

[7]

BANKART, F., & SONS, *Red Jacket Works, Briton Ferry, Glamorganshire; and 9 Clement's Lane, Lombard Street, London.*—Copper and ores.

[8]

BARBER, WALKER, & CO., *Eastwood, Nottinghamshire.*—Coals.

[9]

BARKER, RICHARD, *Wood Bank, Egremont, Cumberland.*—Hematite iron ores, and spars associated with them.

[10]

BARKER, RAWSON, & CO., *Sheffield.*—Leads: white, red, and refined.

[11]

BARNES, THOMAS ADDISON, *Grosmont Iron Works, Whitby, Yorkshire.*—Grosmont ironstone and pig iron, from the Whitby Cleveland district.

[12]

BARRINGER & CARTER, *Mansfield, Nottinghamshire.*—A remarkably fine red moulding sand, found only at Mansfield.

[13]

BARROW, BENJAMIN, *Clifton House, Ryde, Isle of Wight.*—Mineral products of the Isle of Wight.

[14]

BARROW, RICHARD, *Stavelly Works, near Chesterfield.*—Coal, ironstone, and iron.

[15]

BATSON, ALFRED, *Ramsbury, Wilts.*—Devonshire madrepores collected by the exhibitor; inlaid by John Thomas, Babbicombe, Devon.

[16]

BAYLY, J., *Plymouth.*—Ores of copper, tin, and lead.

[17]

BEADON, W., *Otterhead, Honiton, Devon.*—Siliceous sands for stuccoing, plastering, &c. Mineral black, natural pigment. Fine clays, iron ores, &c.

[18]

BELL BROTHERS, *Newcastle-on-Tyne.*—Aluminium and its compounds. Pig iron and iron ores from Cleveland.

[19]

BENNETT, THOMAS, 11 *Woodbridge Street, Clerkenwell, London.*—Specimens of leaf gold.

[20]

BENNETTS, WILLIAM, *Camborne.*—Safety-skip, adapted for raising men and minerals, from coal and copper mines.

[21]

BENTHOLL, H., 14 *Chatham Place, Blackfriars.*—Porphyry.

[22]

BENTLEY, JOHN F., *Stamford.*—Specimens of the building stones, &c., of this district, worked in design.

[23]

BICKFORD, SMITH, & CO., *Tuckingmill, Cornwall.*—Safety-fuse: a small column of gunpowder enclosed in fibrous material or metal, for conveying fire to the charge in blasting.

[24]

BIDDULPH, J., & CO., *Swansea.*—Minerals, iron ore, and coal.

[25]

BIDEFORD ANTHRACITE MINING COMPANY, *Bideford, Devon*.—Mineral black paint and culm.

This superior paint has been exclusively used in her Majesty's dockyards and arsenals, for the last forty years. Its properties are thus spoken of in a certificate bearing date Aug. 12th, 1847:—"Its superiority is observable in the preservation of wood, iron, and canvas. It covers the work well; dries quick and hard; is more

durable, and does not blister like other blacks; and has a body inferior only to white lead.—William Smith, master-painter. Attested, R. Dundas." The paint may be procured from the company, in any quantity, at a moderate price.

[26]

BIRD, EDWARD, *Matlock Bath, Derbyshire*.—Copy of Egyptian obelisk in black marble; paperweights, &c., engraved and etched.

[27]

BIRD, WM., & Co., 2 *Laurence Pountney Hill, London*.—Specimens of British iron, steel, and tin-plates.

[28]

BIRLEY, SAMUEL, *Ashford, Derbyshire*.—Black marble table inlaid with arabesques, &c.

[29]

BLAENAVON IRON AND COAL COMPANY, *Monmouthshire, and Cannon Street, London*.—Iron angle bars, tee rails, weldless tires, girders, and pigs.

[30]

BLAENCLYDACH COAL COMPANY, *Neath*.—Samples of coal.

[31]

BOLCKOW & VAUGHAN, *Middlesborough, Tees*.—Coal, coke, ironstone, pig iron, rail, plate, bar, and other manufactured irons.

[32]

BOUNDY, T., *Swansea*.—Arsenic.

[33]

BOWLING IRON COMPANY, *near Bradford, Yorkshire; London, 5 Bankside*.—Boiler plates, tyres, bars, angles, &c.

[*Obtained a First Class Medal of 1851 Exhibition, and the Silver Medal of the Paris Exhibition, 1855.*]

In order to give a general idea of the nature and scope of their operations, the Bowling Iron Company subjoin a list of the various branches of the iron trade in which they are engaged.

manufacturers of plates, tyres, bars, sheets, hoops, angle and tee iron, steam hammers, and forgings.

The sole agents for London, France, Germany, &c., are Messrs. Macnaught, Robertson, and Craig, whose offices in London are at 14 Cannon Street, E.C., and 5 Bankside, S.E.; and in Paris at 55 Rue de Douai.

Iron-masters, engineers, millwrights, boiler-makers, &c.,

[34]

BOXALL, JOHN JAMES, *Pulborough, Sussex*.—Green sandstone. Pulborough church, which is 600 years old, is built of this stone.

[35]

BRADLEY, CHRISTOPHER L., *Prior House, Richmond, Yorkshire*.—Copper and lead ore from the mountain limestone, Yorkshire.

[36]

BREWER, ROBERT, *Rudloe Firs, Corsham, Chippenham*.—Stone vase, and two cubes of Bath stone.

[37]

BRIGHT, S., & Co., *Buxton*.—Fine black marble vases, and inlaid mosaic work.

[38]

BRISTOL AND FOREST OF DEAN COMPANY, *Princess Royal Colliery, near Lydney*.—Coal, from the Yorkley and Whittington seams.

[39]

BROWN, J., & Co., *Sheffield*.—Samples of steel manufacture.

[40]

BROWN & JEFFCOCK, Civil and Mining Engineers, *Barnsley*.—Coals and ironstones from South Yorkshire coal fields; geological and mining maps and sections.

Specimens of the following coals are exhibited, viz., Melton Field, or Wathwood, or Wood Moor; Cannel coal from same bed; Woolley Silkstone, or Abdy, or Winter; High Hazel, or Kent's thick coal; Barnsley, or Elsecar, or Darnall; Flockton; Parkgate; Thorncliffe thin; Silkstone four feet; Silkstone; Halifax or Ganister bed.

Ironstones from the South Yorkshire coal-field, as used at the Milton and Elsecar, Parkgate, and Thorncliffe Iron Works. At the Parkgate Iron Works, near Rotherham, armour plates for the new ships of war are made in large quantities.

MAP of the SOUTH YORKSHIRE COAL-FIELD, showing the outcrops of the coals, directions of the faults, and the situation of the various collieries and iron works.

Sections showing the relative position of the coals and ironstones worked in this district.

One class of coals is very valuable for iron and steel making, and for locomotive and marine steam-engines; other kinds are suitable for gas-making and domestic purposes, and are well known in the London and other markets, as Flockton, Silkstone, Barnsley House coal, &c.

[41]

BROWN & RENNIE, *Kilsyth, by Glasgow*.—Coal and coke.

[42]

BROWNE, WILLIAM, *St. Austell, Cornwall*.—China clay of every description, china stone, and red hematite iron ore.

The exhibitor has on sale at his various works, china clay of the purest descriptions, suitable for every purpose; and can supply china stone in any quantity for pottery

and other manufactures. He offers, also, a large supply of exceedingly rich red and black hematite iron ores from his mines in Devonshire.

[43]

BRUNTON, J. D., *Barge Yard, Bucklersbury*.—Condensed peat, and peat charcoal.

[44]

BRUNTON, W., & Co., *Penhellick Safety-Fuse Works, near Camborne*.—Safety-fuse for blasting in mining, quarrying, and submarine operations.

W. Brunton & Co. are manufacturers of every description of safety-fuse; and the inventors of the gutta-percha fuse, which has been supplied to the Royal Arsenal,

Woolwich, to the Arctic expedition, and which is in use in every part of the globe. The branch works of the firm are at Brymbo, near Wrexham.

[45]

BUDD, J. P., *Swansea*.—Iron, and tin-plates.

[46]

BULL, GEORGE, D.D., Dean of Connor, *Redhall, Co. Antrim*.—Large quartz crystal, or Irish diamond; weight 83½ lbs.

[47]

BUTLIN, THOMAS, & Co., *East End Iron Works, Wellingborough*.—Iron and its ores.

[48]

BUTTERLEY COMPANY, *Butterley Iron Works, Alfreton*.—Section of coal-pit. Armour plates, deck beams, rolled girders, joists, and other iron.

[49]

BWLCH Y GROES SLATE COMPANY (Limited), *Llanberis, Carnarvon*.—Roofing slate; the green a fine specimen.

[50]

BYERS, JOSHUA, & SON, Producers and Manufacturers, *Stockton-on-Tees, Durham*.—Lead ore from Grasshill mine, Teesdale. Silver and litharge. Refined, common, and slag leads, sheet lead; lead pipe; and thin sheet lead.

[Obtained Prize Medal at the Exhibition of 1851.]

[51]

CAITHNESS, EARL OF, 17 *Hill Street*.—Caithness flags.

[52]

CALOW, JOHN THOMAS, *Staveley, Derbyshire*.—Patent safety apparatus for shafts of mines, &c.

[53]

CAMPBELL BROTHERS, *William Street, Blackfriars*.—Pig and bar iron, manufactured at Calder and Govan Iron Works.

[54]

CANNAMANNING CHINA CLAY COMPANY, *Newton Abbott*.—Pipe, potters', and china clays.

[55]

CASE & MORRIS, Proprietors, *Rose Bridge, Three Hall Collieries, Ince, Wigan*.—Section of actual strata of Rose Bridge and Ince Hall collieries, coal, &c.

[56]

CHAFFER, THOMAS, *Burnley, Lancashire*, and 14 *Great Howard Street, Liverpool*.—Wors-
thorne, Hambleton, and Portsmouth stone.

[57]

CHAMBERS, J., *Alfreton*.—Coal.

[58]

CHEESEWRING GRANITE COMPANY, 6 *Cannon Street, Cornwall*.—Design by John Bell for memorial of the Exhibition of 1851, one-fifth full size. (*Nave*.)

[59]

CHILD, W. J. & T., *Hull, Leeds, and Grindleford Bridge, Derbyshire*.—French and Derby-
shire Peak millstones.

[60]

CLAY CROSS COMPANY, *Clay Cross, near Chesterfield*.—Samples of coal, lime, limestone, iron-
stone, and pig iron.

[61]

COAL OWNERS OF NORTHUMBERLAND AND DURHAM, *Newcastle-on-Tyne*.—Map and section
of coal-fields.

[62]

COCHRANE & Co., *Woodside, Dudley, and Ormesley Iron Works, Middlesborough-on-Tees*.—
Iron pipes and pig iron.

[63]

COLLES, ALEXANDER, *Marble Mills, Kilkenny*.—Black Kilkenny marble chimney-piece,
made by machinery.

[64]

COLLEY, GEORGE, 8 *Upper Dorset Street, Belgrave Road, Pimlico*.—Vase in freestone.

[65]

CONNORREE MINING COMPANY, *Connorree Mines, Ovoca, Ireland*.—Sulphur pyrites, precipi-
tate of copper, and sulphur and copper ores.

[66]

COPELAND, GEORGE ALEXANDER, *Carwythenack House, Constantine*.—A series of patent
waterproof blasting cartridges.

[67]

CORBETT, W. F., *Great Charles Street, Birmingham*.—Apparatus to prevent over-winding
at pits.

[68]

CORBETT, JOHN, *Stoke Prior Salt Works, Bromsgrove, Worcestershire*.—Refined* table salt,
butter salt, and provision salt.

[69]

COURAGE, ALFRED, & Co., *Bagillt, Flintshire*.—Lead smelting, and manufacturing patent
sanitary pipes. Zinc spelter making.

[70]

COWPEN COAL COMPANY, *Cowpen Colliery, Blyth*.—Black of Cowpen Hartley steam coal.

[71]

COX, BROTHERS, & CO., *Derby*.—Red, white, and orange lead, shot, lead pipes, plates of Derbyshire silver, &c.

[72]

CRAIG, GEORGE, & SON, *Caithness Pavement Works, Thurso*.—Specimen of Caithness flags for tables, shelving, and pavement.

[73]

CRAWLEY, C. E., *17 Gracechurch Street*.—Improved miners' safety-lamp, combining greater safety with increased light. (See page 7.)

[74]

CRAWLEY, G. B., *Neath*.—Samples of coal.

[75]

CRAWSHAY, H., & CO., *Lightmoor Collieries, Cinderford*.—Rocky vein coal.

[76]

CRAWSHAY, H., & CO., *Abbot's Wood Mines, Cinderford*.—Black Brush iron ore.

[77]

CROWN PRESERVED COAL COMPANY (Limited), *62 Moorgate Street, London*.—Preserved coal.

[78]

CWMORTHIN SLATE COMPANY (Limited), *Merionethshire*.—Slates and slabs.

[79]

DABBS, JOHN, Agent for LORD NORTHWICK, *Stamford*.—Freestone from Ketton Quarries, Rutland.

[80]

DAGLISH, JOHN, *Hetton Collieries, Durham*.—Model of ventilating furnace for coal-mines; self-registering water-gauge.

[81]

DAVIS, DAVID, *Bute Crescent, Cardiff*.—Sample of Davis's upper four feet and Blaengwawr Merthyr steam coals.

These coals are on the English, French, and Spanish Government lists, and are largely consumed in steam ships, locomotive engines, and manufactories throughout the world. The following companies (as well as the London contractors, and consumers in every country) will testify to their superior quality :—

The Peninsular and Oriental Steam Packet Company.
The West India Royal Mail Steam Packet Company.
The Montreal Mail Packet Company.
The Philadelphia and New York Transatlantic Company.
The Cunard Royal Mail Company.

REPORT of William Allen Miller, Esq., M.D., F.R.S., King's College; of W. Hoffman, Esq., LL.D., F.R.S., Royal College of Chemistry; and E. Frankland, Esq., Ph. D., F.R.S., Saint Bartholomew's Hospital.

DAVID DAVIS'S MERTHYR AND STEAM COALS.	Nine-feet Vein.	Upper Four-feet Vein.	CHEMICAL ANALYSIS OF 100 PARTS OF DRIED COAL.	Nine-feet Vein.	Upper Four-feet Vein.
Theoretic and exportative power of } 1 lb. of this coal }	15·882	15·895	Ash	1·83	2·50
Specific gravity	1·328	1·356	Carbon	89·52	89·27
Coke	88·05	85·60	Hydrogen	4·31	4·42
Moisture	0·68	0·83	Nitrogen	1·20	1·32
Frangibility { Large	75·2	78·8	Sulphur	0·89	0·78
{ Small	24·8	21·2	Oxygen	2·25	1·71

CRAWLEY, C. E., 17 *Gracechurch Street*.—Improved miners' safety-lamp, combining greater safety with increased light.



This lamp combines several important advantages, viz.,

1st. Without the use of glass it gives from three to four times the light of the common "Davy lamp."

2nd. It never requires snuffing, thus not only keeping the inside of the lamp from getting foul, but giving less trouble to the miner, and at the same time producing a more even light.

3rd. It will, on account of its peculiar construction, consume, while burning with a good flame, from one to two cubic feet of gas per minute (the light being thereby improved), thus tending, though in a small degree, to prevent the accumulation of gas, and so to some extent to lessen the risk of explosion.

4th. Owing to the fact of the gas passing into the lamp principally from below, the wire gauze that covers the flame does not readily become red hot.

5th. It can be instantly extinguished, if required, without trouble; a matter of great importance in case of a sudden irruption of gas.

6th. The lock is very simple, though entirely differing in principle from all others now in use, and is rendered perfectly secure, by means of a seal placed over the lock and completely concealing it, in such a manner as to render it absolutely impossible to open the lamp without breaking the seal, thus forming a perfect detector. This seal consists of a very small thin metal disc, having any kind of device stamped upon it, which could be varied from day to day; none but the one authorized person knowing beforehand what seal would be used on any particular day.

7th. The great increase, however, in the light would of itself remove the chief temptation to open the lamp, added to which, it gives, if anything, less light when opened.

8th. It is also, under ordinary circumstances, impossible to light a pipe by drawing the flame through the gauze, as is the case with the "Davy."

9th. Nor, for the same reason, can the flame be driven through the gauze by a current of air; which being the case in the "Davy," has been supposed to be the cause of so many explosions.

10th. There is also another patent improvement in this lamp which will be hailed by the miner as a great boon, viz., an insulated handle, which enables it to be carried at all times without inconvenience, however hot the rest of the lamp may become.

These lamps are made entirely by machinery, and the manufacture is carefully superintended by the patentee, so as to insure perfect accuracy in the fitting of the separate parts, which are very simple, and so constructed, that any part, if accidentally damaged or lost, can be at once replaced without trouble, and at small cost, a stock being always kept on hand for that purpose. Sole manufacturer, C. E. Crawley, 17 *Gracechurch Street*, London, E.C. Sole agent for Wilson's new Patent Oil Press, and Wilson's new Patent Cotton Press.

Any further information may be obtained in the Exhibition building, where attendance will be given daily, between the hours of ten and four.

[82]

DAVIS, JAMES, *Ulverstone*.—Iron pyrites (sulphur ore) from the Millom Mining Company (Limited), Millom, Cumberland.

[83]

DAWES, W. H. & G., *Denby Iron Works, Derby*.—Coal and ironstone.

[84]

DENBY, W., 3 *Denby Place, Sidmouth*.—Mosaic table composed of siliceous pebbles found at Sidmouth.

[85]

DENMAN, LORD, *Stoney, Middleton*.—Grit stone from the district.

[86]

DEVON AND COURTENAY CLAY COMPANY, *Newton Abbott*.—Pipe, potters', and china clays.

[87]

DEVON GREAT CONSOLS MINE, *Tavistock*.—Copper ores.

[88]

DEVONSHIRE, DUKE OF.—Slate in block and manufactured, from Burlington Quarries, Ulverstone, Lancashire.

[89]

DOVE, D., *Nutshell Quarries, Glasgow*.—Grindstones.

[90]

DOWLAIS IRON COMPANY, *Dowlais, Merthyr Tydvil*.—Samples of manufactured iron.

[91]

DUNCAN, FALCONER, & WHITTON, *Carmyllie Quarries, by Arbroath*.—A step; plate landing and pavement slabs.

[92]

DYBALL, T., *Kirton Lindsay*, for SIR CULLING EARDLEY.—Iron ore.

[93]

EAST CORNWALL ARSENIC COMPANY, 9 *Parade, Plymouth*.—Arsenical mundic, unrefined arsenic, refined arsenic, and lump arsenic.

Samples of Arsenical mundic, Unrefined arsenic, Pure white arsenic, finely ground, Pure white lump arsenic, from the works of the company at Hornbarrow, showing the different stages of the manufacture.

Inquiries, &c., may be made of the Secretary, MR. JOSEPH SEALE, 9 Parade, Plymouth; or of the London Agents, MESSRS. JOHN B. DRAYTON & Co., 30 Great St. Helens.

[94]

EASTWOOD & SONS, *Derby*.—Samples of iron.

[95]

EBBW VALE COMPANY, & PONTYPOOL IRON COMPANY, *Ebbw Vale, Newport, Monmouthshire*.—Minerals, tin-plates, and iron manufactures.

[96]

EDDY, JAMES RAY, *Carleton, Skipton, Yorkshire*.—Lead ores, with vein stone.

[97]

EDWARDS, WOOD, & GREENWOOD, *Tame Valley Colliery, Tamworth*.—Iron pyrites and fire clay.

[98]

ELLAM, JONES, & Co., *Maskeaton Mills, Derby*.—Emery, and oxide of iron paint, made from the ore, expressly for iron work.

[99]

ELLIS & EVERARD, *Markfield Granite Quarries, Leicestershire*.—Paving setts—broken for macadamizing; specimens for building, &c.

[100]

EVANS & ASKIN, *Birmingham*.—Nickel, cobalt, and German silver.

[101]

FARNLEY IRON COMPANY, *Farnley, near Leeds*.—Samples of coal, ironstone, pig, boiler-plate, tyres, angle-iron, rivets, and fire-clay goods.

No. 1, 2. Farnley ironstone, raw and calcined.

3, 4. Farnley coal and coke (better bed).

5. Limestone.

6, 7, 8, 9. Samples of Farnley pig metal.

10. Blast furnace dross.

11. Refined metal.

No. 12. Puddled iron.

13. Samples of railway tyre bars.

14. „ ditto, bent cold.

15. „ boiler plate.

16. „ angle iron.

17. „ bar and rivet iron.

[102]

FAYLE & Co., 31 *George Street, Hanover Square*.—Blue clay for the manufacture of earthenware.

[103]

FINNIE, ARCHIBALD, & SON, *Kilmarnock*.—Steam and house coal exported at Troon and Ardrossan, Ayrshire, Scotland.

[104]

FIRTH, BARBER, & Co., *Oak's Colliery, near Barnsley*.—Specimen of Barnsley seam, steam and house coal.

The specimens exhibited of the BARNSELY BED OF COAL from the Oaks Colliery, show the full thickness of the seam, and its divisions into hard and soft coal. The pits from which it is produced are 860 feet in depth.

The hard coal is upon the Indian Council and French

Admiralty lists, and is well adapted for iron making, steel converting, and for locomotive and marine engines; the soft is valuable for domestic purposes. Agents in London at King's Cross Station, Messrs. Beale and Walker.

[105]

FITZGERALD, RICHARD, Clerk, *Clare View, Tarbert, Co. Kerry*.—Peat from Aughrim, near Tarbert, Co. Kerry.

[106]

FORSTER, G. B., *Cowpen Colliery, Blyth*.—Model of coal pit, with cages and apparatus.

[107]

FORSTER, R., *Gateshead*.—Grindstones.

[108]

FOWLER, W., & Co., *Sheepbridge Iron Works, Chesterfield*.—Coal, and ironstone of which armour-plate iron is made.

[109]

FRANKLIN, F., *Galway*.—Polished marble.

[110]

FREEMAN, W. & J., *Millbank Street, Westminster, and Penrhyn, Cornwall*.—Granites and stones. (See page 10.)

[111]

FRYAR, MARK, *School of Mines, Glasgow*.—Plans and drawings relating to mining.

FREEMAN, W. & J., *Millbank Street, Westminster, and Penrhyn, Cornwall.*—Granites and stones.

[*Obtained a Medal and Certificate at the Exhibition of 1851.*]

W. & J. Freeman exhibit specimens of granites from the Cornwall and other quarries; building stones from the oolite of Portland, used at the British Museum, and numerous other edifices; stones from the Bath and Painswick quarries; magnesian limestone from Huddlestons, used in the erection of York Minster, and other churches; sandstone from Hare Hill, and other quarries in Yorkshire; flag and landing stones from the same locality, used extensively for the London footways and buildings; millstone grit, for bridge and dock works.

The works supplied by Messrs. Freeman include the docks of Keyham, Chatham, Deptford, Jarrow, Commercial, East and West India, Birkenhead, Liverpool, Hull, &c.; the harbours of refuge at Alderney, Dover, and Portland; bridges over the Thames and Medway; light-houses at Beachey Head, Bishop's Rock, Guernsey, and

the Basses in the East Indies; the plinth and lodges in front of the British Museum, and the monoliths in the King's Library of that building; the plinth at the Royal Exchange, and the steps and landings for the terraces at the Crystal Palace; and the obelisk from the Exhibition of 1851, since erected in Chelsea College.

The polished granites in the obelisk at Scutari, and the pedestal for the statue of Carlo Alberto at Turin, containing stones upwards of twenty feet in length; the pedestal for the statue of Richard Cœur de Lion, in front of the Houses of Parliament, each by Baron Marochetti; and the monoliths for the mausoleum erected to the memory of her late Royal Highness the Duchess of Kent, from the design of Mr. Humbert, were executed at the polishing works connected with their quarries at Penrhyn.

[112]

GAMMIÉ, GEORGE, *Shotover House, Oxfordshire.*—Native Oxford ochre.

[113]

GARDNER, ROBERT, *Sansaw, Shrewsbury.*—Grinshill building stone; copper ore; barytes.

[114]

GARLAND, T., *Fairfield, Redruth.*—Arsenic.

[115]

GENERAL MINING COMPANY FOR IRELAND, *Westmoreland Street, Dublin.*—Zinc ores, spelter, fire-clays, and ochres, from Silvermines, Tipperary.

[116]

GEOLOGICAL SURVEY OF THE UNITED KINGDOM, *Geological Survey Office, 28 Jermyn Street.*—Published maps and sections of England, Scotland, and Ireland, 1-inch and 6-inch scales.

[117]

GIBBS & CANNING, *Tamworth.*—Glazed stoneware sewerage pipes, fire-bricks, and terracotta.

[118]

GILBERTSON, W., & Co., *Swansea.*—Tin-plates.

[119]

GILKES, WILSON, PEASE, & Co., *Middlesborough.*—Samples of pig iron and test bars; samples of iron ores.

[120]

GODDARD, EDWIN, for EDWARD BLAKE, *Newton Abbott.*—Tobacco-pipe clay; potters' clay; papermakers' clay; china clay.

[121]

GOLDSWORTHY, THOMAS, & SONS, *Hulme, Manchester.*—Emery, emery and glass cloths and papers, whetstones, and polishing-stones; knife-cleaning machine.

[122]

GOVERNOR AND COMPANY OF COPPER MINERS IN ENGLAND (*Cwm Avon Works, Glamorganshire, W. P. STRUVE, Esq., Manager of the Works*), Offices, 10 *New Broad Street Mews, London, E.C.*—Coal; iron mine, iron, copper, yellow metal, tin-plates, chemicals, &c.

[*Obtained Certificate of Honour for tin-plates, and Prize Medal for railway iron, at the Great Exhibition of 1851; and Grande Médaille d'Honneur for railway iron at the Paris Exhibition, 1855.*]

Copper.



Ingot, cake, wire bar, sheets, ships' sheathing, copper rails for gunpowder magazines, bolts and strips rolled thin, to show the malleability of the metal.

Trade mark.

Yellow Metal (alloy of copper and zinc).



Sheets, ships' sheathing, and rails.
Rails, bolts, and composition nails.

Trade mark.

Iron produced and manufactured at Cwm Avon Works.

Pig iron for rails.

These rails and sections of rails are exhibited in Class V.

Various sections of rails made at these works.

One large bridge rail, 90 feet long, 58 lbs. per yard.

One flanch rail, 63 feet long, 3 $\frac{3}{4}$ lbs. per yard.

Fish-plates, merchant bars.



Sheet iron, known as Canada plates, made from iron specially prepared.

Trade mark.

Samples of wrought iron tested.

Chemicals.

Miscible naphtha (Pyroxilic spirit), as supplied to the Board of Inland Revenue for making "Methylated spirit."

Coppers, limesalt, black or brown, and white or gray.

Minerals and specimens of Iron, illustrating the process of preparing Iron for Tin-plates.

Argillaceous iron ore (known as "Welsh mine").

Cold blast pig iron, made expressly for plates.

"Stamps" refined with charcoal only.

Bars.

Black or tole plate, in the form of a book, rolled to exhibit the malleability of the metal, weight $\frac{1}{2}$ oz. per square foot.

Block tin specially refined for use.

Tin-plates (iron superficially alloyed with tin).

Trade Marks.

E C C.	1 C.	1xxxxx.	
or	DLDxx.	Dxxxxx.	DBD.
V S.		III.	
C A.	1 C.		
B I.	1 C.		

Terne Plates (iron superficially alloyed with tin and lead).

Trade Marks.

E C C.	
or	D.
V S.	
C A.	1 C.
B I.	1 C.

A mechanical contrivance for facilitating calculations, invented and patented by Mr. Robert Dunlop, one of the Company's agents at Cwm Avon.

No. 1 embraces calculations from $\frac{1}{32}$ of an unit to upwards of 90,000 in multiplication; and from $\frac{1}{32}$ of a penny to twenty shillings in division.

No. 2 embraces calculations of whole numbers or decimals for multiplication or division for any sum containing from one to nine figures.

[123]

GOWANS, JAMES, *Rockville, Merchiston Park, Edinburgh.*—Boring machines, wedge, and galvanic apparatus for blasting.

The following are exhibited :—

1. Machine for boring holes in stone, upon the drill principle.
2. Machine for the same purpose, upon the ram principle.

3. Expanding wedge used in place of the pinch.

4. Galvanic battery and apparatus used for blasting at Redhall quarry, Edinburgh, and also at the Exhibitor's Railway Works, and elsewhere.

[124]

GRAHAM, ABRAHAM, Stone Merchant, *Huddersfield.*—Building stones and hard paving-stones.

[125]

GRANVILLE, THE EARL, *Shelton, Staffordshire.*—Minerals and pig iron.

- [126]
 GRAY, JAMES, M.D., *Glasgow*.—Modification of Davy's lamp.
- [127]
 GREAVES, JOHN W., *Portmadoc, North Wales*.—Roofing slates.
- [128]
 GREAVES & KIRSHAW, *Warwick, and South Wharf, Paddington*.—Hydraulic lias, lime, and cement; smooth polished lias stone.
- [129]
 GREENWELL, G. C., *Radstock*.—Sections of and specimens from Somersetshire coal-field.
- [130]
 GREENWELL, G. C., for WESTBURY IRON COMPANY (Limited), *Westbury, Wilts*.—Section of ironstone and furnace products.
- [131]
 GREGORY, J. R., 25 *Golden Square, London*.—Minerals, fossils, and rocks; Devonian fossil fishes from Scotland.
- [132]
 HALIFAX CORPORATION, *Halifax, Yorkshire*.—Building and other stones, coals, and ironstone in and near Halifax.
 Specimens of building and other stones; also of coals, clays, iron pyrites, and fossiliferous remains found in the town and parish of Halifax.
- [133]
 HALL, J. & T., *Derby*.—Marble and spar vases and ornaments, and mosaic works in marble.
- [134]
 HALL, JOHN, & Co., *Stourbridge*.—Stourbridge fire-clays, gas-retorts, furnace bricks, melting-pots, crucibles, &c.
- [135]
 HALLIDAY, THOMAS C., *Greetham, Rutland*.—Clipham stone; blocks all sizes, will stand all weather.
- [136]
 HAMPSHIRE, J. K., *Whittington Collieries, Chesterfield*.—Safety apparatus, for raising and lowering persons in shafts.
- [137]
 HAMPSHIRE, MATTHEW, & Co., Stone Merchants, *Spring Street, Huddersfield*.—Building stones.
- [138]
 HANCOCK, ROBERT, *Polberro, St. Agnes, Cornwall*.—Pulverized ore dressing machine.
- [139]
 HARPER & MOORES, *Lower Delph Clay Works, Stourbridge*.—Glasshouse-pot clay, retorts, fire-bricks, lumps, &c.
- [140]
 HARRIS, JOSIAH, *Newton Abbott, Devonshire*.—Ores of iron, tin, lead, copper, blende, manganese, bismuth, and antimony.
- [141]
 HARRISON, AINSLIE, & Co., *Newland Furnace, Ulverstone*.—Lindal Moor hematite, puddling ores, and Lorn pig iron.
- [142]
 HARRY, G., *Swansea*.—Copper, silver, iron, zinc, and nickel ores, and metals.
- [143]
 HAWKSWORTH, WILLIAM, & Co., *Linkithgow*.—Cast steel, engravers' steel plates, patent steel rifle barrels, and tubing.
- [144]
 HEATH, EVANS, & Co., *Aberdare*.—Steam coal.

[145]

HEAVEN, W. H., *Lundy Island, Clovelly, North Devon*.—Specimens of Lundy Island granite.

[146]

HEGINBOTHAM, PETER, & SON, *Shallcross Mills, Whaley Bridge, near Stockport*.—Sulphate of barytes, unbleached, bleached, and unmanufactured.

[147]

HENDERSON, G. W. M., *Fordell, Fifeshire*.—Carved block of sandstone.

[148]

HENDERSON, JAMES, C.E., *Truro, Cornwall*.—A plan and section of a Cornish mine.

[149]

HENGISTBURY IRON MINING COMPANY, *Christchurch, Hants*.—Iron ore.

[150]

HENSON, ROBERT, 113A *Strand*.—Ornaments in marble and minerals.

[151]

HEWLETT, ALFRED, for the EARL OF CRAWFORD AND BALCARRES, *Haigh Colliery, Wigan*.—Cannel coal for making gas.

[152]

HIGGS, SAMUEL, & SON, *Penzance*.—Model of tin-dressing floors, safety-lamp, and specimens of tin and copper ores.

[153]

HILL, FREDERICK, *Helston*.—Specimens of ores, metals, minerals, clay, marl, elvans, and stone produced in Helston mining district.

[154]

HIRD, DAWSON, & HARDY, *Low Moor Iron Works*.—Samples of iron in various stages of manufacture.

[155]

HOLLAND, SAMUEL, & CO., *Portmadoc, Carnarvonshire*.—Roofing slates.

[156]

HOLMES, JOHN, *Bolton Wood Quarries, Bradford*.—Monument sculptured by Francis Stake & Co., Bradford, Yorkshire.

[157]

HOLROYD, JAMES, & SONS, Stone Merchants, *Brighouse*.—Flag and building stones.

[158]

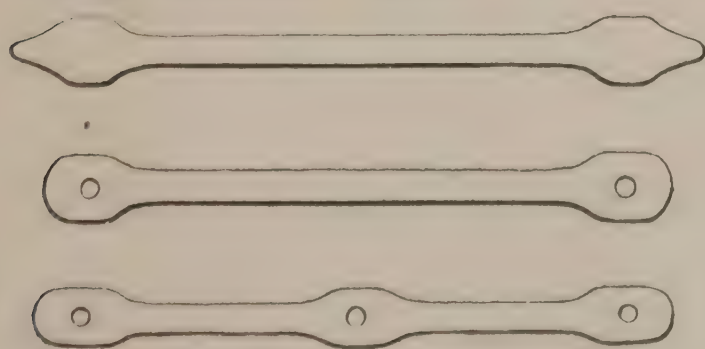
HOOPER & MOORE, *Stourbridge*.—Fire bricks, &c.

[159]

HOWARD, HON. JAMES, 1 *Whitehall Place, London*.—Forest of Dean stone, coal, iron ore, clay, and pottery.

[160]

HOWARD, RAVENHILL, & CO., *King and Queen Iron Works, Rotherhithe, London*.—Patent bridge links rolled entire.



Improved Patent Links; for suspension and Girder bridges, roofs, and other purposes; the bar and heads rolled into form at one heat, avoiding the uncertain process of welding.

[161]

HOWARD, THOMAS, C.E., *Bristol*.—Samples of the building and other stones in the Bristol district.

[162]

HOWIE, JOHN, *Hurtford Colliery, Kilmarnock, Scotland*; Shipping ports, *Troon and Ardrossan*.—Three pieces of coal.

[163]

HUNT, JOHN, *Porthleven, Helston, Cornwall*.—Model of patent ore-separator; portable gold-washer; phosphate of lead.

[164]

HYNAM, JOHN, 7 *Prince's Square, Finsbury*.—Purified dried fullers' earth, for blanket and cloth manufacturers and silk dyers.

[165]

IBBERSON, JOHN, Stone Merchant, *Lockwood, Huddersfield*.—Building stones.

[166]

IRVING, GEORGE VERE, Esq., *Newton, Lanarkshire, N. B.*—Minerals of the Leadhills district, Lanarkshire, Scotland.

[167]

JACKARD, E., & Co., *Ipswich*.—Coprolites from green sand and crag.

[168]

JENKINS, W. H., & Co., *Victoria Place, Truro, Cornwall*.—Ochre, umber or bistre brown, used for painting, paper-staining, paper-making, &c.; fluorspar, flux for smelting, making fluoric acid, &c.; felspar glaze for earthenware, porcelain, &c.

[169]

JENNINGS & Co., *Swansea*.—Arsenical ore, arsenic unrefined, refined crystals, powdered and lump arsenic.

[170]

JENNINGS, WILLIAM, *Victoria Street, Hereford*.—Specimen of "Three Elms Quarry" stone, near Hereford.

[171]

JOHNSON, MATTHEY, & Co., 78 & 79 *Hatton Garden, London*.—Platinum, and preparations of the precious metals.

[172]

JOHNSON, W. W. & R., & SONS, *Limehouse, London*.—Wetterstedt's patent metal for roofing and other purposes.

[173]

JONES & CHARLTON, *Duckinfield, Manchester*.—Self-extinguishing detector and patent safety-lamp.

[174]

JONES, DANIEL, *Bradford-on-Avon, Wilts.*—Stone from Bath Farleigh Downs.

[175]

JONES, DAVID, *Hay, South Wales*.—Specimen of gray sandstone from Pontvain Quarries, near Hay, South Wales.

[176]

JONES, DUNNING, & Co., *Middlesborough*.—Pig iron.

[177]

JONES, I., *Swansea*.—Flat chain.

[178]

JONES, W., *Port Tennant, Swansea*.—Fuel for steam purposes.

[179]

JORDAN, H. K., 2 *Clifton Wood Terrace, Clifton, Bristol*.—Minerals.

[180]

JORDAN, JAMES B., *Museum of Practical Geology, London, S.W.*—Models of mineral forms, constructed of cardboard.

[181]

JORDAN, THOMAS B., 15 *Union Grove, Clapham*.—Improved miners' theodolite, and model of Holm Bush Mine.

[182]

JORDAN, WILLIAM HATH, 14 *Langham Street, Regent Street*.—Model of pit-frame and safety-cage.

[183]

JULEFF, JOHN, *Flore Street, and Pednandrea, Redruth, Cornwall*.—Cornish assay crucibles for copper, silver, &c.; goldsmiths' and metallurgists' crucibles.

[184]

KAY, WILLIAM, *Hayhill, Ochiltree, Ayrshire*.—A pair of curling-stones.

[185]

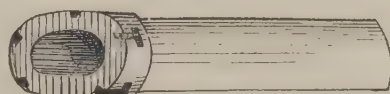
KAYE, GEORGE, Stone Merchant, *Ryecroft Edge, Huddersfield*.—Building stones.

[186]

KELL, RICHARD, & Co., *Newcastle-on-Tyne*.—Grindstone, manufactured at Gateshead Fell, suitable for all purposes.

[187]

KING BROTHERS, *Stourbridge Fire-Clay Works, Stourbridge*.—Clay retorts; bricks; section of clay as it is found in the mine.



The exhibitors are proprietors of Stourbridge clay, and manufacturers of glass-house pots, retorts, and crucibles, and every description of fire-bricks and other fire-clay goods. Their branch works are at 38 Lichfield Street, Birmingham. Applications for tenders and tracings must be addressed Stourbridge.

[188]

KINSMAN, REV. R. B., M.A., *Tintagel, Camelford*.—Specimens of roofing slates from the Tintagel slate-quarries.

[189]

KIRKSTALL FORGE COMPANY, *Leeds*.—Samples of manufactured malleable iron, showing excellence of quality.

[190]

KNIGHT, F. WINN, *Exmoor, South Molton*.—Spathic and other iron ores from Exmoor Forest. (See page 16.)

[191]

KNOWLES, ANDREW, *Highbank, Pendlebury*.—Safety-cage for coal-mines—Owen's patent.

[192]

LAMACRAFT, W., *Newton Abbott*.—Clays.

[193]

LAW LIFE ASSURANCE SOCIETY, *Fleet Street, E.C.*—Green and black marble, from Connemara, Co. Galway.

KNIGHT, F. WINN, *Exmoor, South Molton*.—Spathic and other iron ores from Exmoor Forest.

Sample of red, brown, and spathic iron ores, and clay ironstone from some of the principal veins in Exmoor Forest.

No. 1 is from the Hangley Cleve lode; No. 2, Topdeer Park lode; No. 3, Double lode; No. 4, Ebenezer Rogers lode; No. 5, Roman lode; No. 6, Cornham Ford lode; No. 7, Woolcombe lode; No. 8, Huel Eliza lode; No. 9, Picked Stones lode; No. 10, Blue lode; No. 11, Hoar Oak lode; No. 12, North Forest clay ironstone.

These iron ores are found in large veins in the Devonian slates of West Somerset, in the high lands which rise about ten miles west of Taunton, and run westward into the sea near Ilfracombe and Combmartin.

Old workings, supposed to be Roman, are found on the outcrops of these veins along the whole length of the Brendon and Exmoor Hills.

These ores are precisely similar to those which have long been worked in the Siegen district of Western Germany.

The value of this class of ores in producing steel and iron of the finest qualities was not known in England until the Great Exhibition of 1851, when their prototypes were brought over and shown by the continental

iron-masters as the ores from which their finest steel and iron were made.

The old workings of West Somerset were then reopened; and their ores are now worked in considerable quantities in the Brendon Hills by the Ebbw-Vale Company, who have laid down a mineral railway from the mines to the port of Watchet.

These veins contain in some places more than 20 feet in width of solid iron ore.

The ores may be seen in great strength in the Exmoor Hills; but until a railway is constructed to one of the adjoining ports they cannot be worked at a profit.

The lands between the Exmoor mines and the sea are in the hands of few and friendly parties, and no Act of Parliament would be necessary for the formation of such a line.

These ores are very rich, and contain no trace of sulphur or phosphoric acid, or any other deleterious matter.

Address of Exhibitor—

Fred. Winn Knight, Esq., M.P., Simonsbath Lodge, Exmoor, Somerset.

[194]

LAYCOCK, JOSEPH, *Newcastle*.—Cast-iron jointed prop, used in the working of pillars in coal-mines.

[195]

LEE MOOR PORCELAIN CLAY COMPANY, *Plympton, Devon*.—Porcelain clay or kaolin, fire, and architectural goornite bricks.

[196]

LEESWOOD GREEN COLLIERY COMPANY, *near Mold*.—Section of the celebrated Leeswood Green cannel coal.

[197]

LEETCH, JAMES, 68 *Margaret Street, Regent Street, W.*—Preparation of fluorspar on cloth, paper, &c., for grinding and polishing.

[198]

LEISS, FREDERIC, 30 *Southampton, Street, Strand*.—A collection of articles manufactured of the mineral mica—patent.

[199]

LEVER, ELLIS, *West Gorton Works, Manchester*.—Flexible tubing, fly-door, and brattice, used in ventilating mines.

ELLIS LEVER is the inventor and sole manufacturer of the flexible tubing; for the ventilation of shafts and exploring drifts in mines. He makes also, in every width, improved brattice and door-cloth, for air-courses and stop-

pings in the workings of fiery mines. The brattice cloth of his manufacture, was used in restoring the ventilation in the shaft of the unfortunate Hartley Colliery.

[200]

LEVICK & SIMPSON, *Newport*.—Iron ores.

[201]

LILLESHELL COMPANY, *Shiffnal, Shropshire*.—Minerals, castings, malleable specimens.

[202]

LIVINGSTONE, ALEX. S., *Llanelly, Carmarthenshire*.—Patent fuel for marine, locomotive, smelting, and domestic purposes, for all climates.

[203]

LIZARD SERPENTINE COMPANY (Limited), 20 *Surrey Street, Strand, London*.—Various works and specimens of serpentine.

[204]

LLANGOLLEN SLAB AND SLATE COMPANY (Limited), 4 *South Wharf Road, Paddington*.—Enamelled slate work; large slate slab.

[205]

LLETTY SHENKIN COAL COMPANY, *Cardiff and Aberdare, South Wales*.—Thomas's Merthyr smokeless Welsh coal.

[206]

LOMAS, JOHN, & SONS, *Marble Works, Bakewell, Derbyshire*, and S. BIRLEY, *Ashford*.—Eight specimens of the Derbyshire marbles.

[207]

LONDONDERRY, MARCHIONESS OF, *Seaham Hall*.—Three blocks of Pensher sandstone, and model of Seaham harbour and town.

[208]

LONGMAID, WILLIAM, *Arthur Lodge, St. Philip's Road, Dalston*.—Specimens of iron alloyed with gold and platinum.

[209]

LOWES & ROBINSON, *Stanhope, Darlington*.—Case of minerals; section of Weardale strata.

[210]

LOWRY, J. W., 45 *Robert Street, Hampstead Road, N.W.*—Engravings of fossils for the Geological Survey of United Kingdom.

[211]

LUCAS & BARRATT, *Stockton-on-Tees*.—Pig iron.

[212]

LUMBY, JOHN, *Stamford*.—Ironstone, gray and black; pyrites, coal, fire and terra-cotta clay.

[213]

LUND HILL COAL COMPANY, *Lund Hill Colliery, Barnsley*.—Specimens of Barnsley seam, steam, and house coal.

This specimen shows the thickness of the "BARNSELY" SEAM OF COAL as worked at this colliery; it is divided into soft or house coal, and hard or steam coal. The soft is very suitable for domestic purposes, and for making gas, of which it yields a large amount, and of brilliant quality;

the hard portion is very valuable as a steam coal, both locomotive and marine, and is upon the English Admiralty list. The pits are 660 feet in depth. Agent, Mr. Thorneycroft, King's Cross Station.

[214]

MACDONALD, ALEXANDER, *Polished Granite Works, Aberdeen*.—Specimens of granite used in building, decoration, memorials, and general purposes.

[*Obtained the Prize Medal in Class XXVII., in 1851; and the Silver Medal in Paris, in Class XIV., in 1855.*]

No. 1. Polished red granite jointed Doric column, showing the closeness of, and flush surfaces of joints, when built in pieces by the exhibitor's patent process. In this way constructive and decorative erections of any size or form are made.

No. 2. Polished red granite pedestals for busts, vases, groups, &c.

No. 3. Gray granite Gothic headstone memorial, showing "fine axing," and the contrast between axed and polished surfaces.

No. 4. Polished red and blue granite Gothic baptismal font.

No. 5. Polished blue granite tomb,—specimen of ceme-

tery memorial, which will retain its colour and polish under all atmospheric changes. Made of same granite as the sarcophagus executed for H.R.H. the Duchess of Kent's tomb at Frogmore.

No. 6. Polished red granite chimney-piece for public rooms. The polish and colour cannot be destroyed by smoke, or in any other way. Two large slabs, vases, and circular shafts, showing the material, red and blue.

No. 7. (Placed in court between Mineral and Agricultural Departments.) Polished red granite public drinking-fountain in operation. By experience granite is found effectually to withstand the action of water and frost, and not to contract any stain from vegetation.

[215]

MAGNUS, L. S., *Chatham, and 3 Adelaide Place, London Bridge*.—Coals, and products; Magnus's patent coke; iron ores.

Among the articles exhibited by Magnus and Son will be found a sample of SOUTH BRANCEPETH GAS COAL.

These coals give an extraordinary quantity of gas of high illuminating power, and a coke of superior quality: they are shipped at West Hartlepool.

These coals and coke, as well as other descriptions of

coal, can be obtained of Messrs. Simon Magnus and Son, who will undertake the delivery in any part of England or at any port.

Price lists of every description of coal may be obtained by application to the exhibitors, at their offices, 3 Adelaide Place, London Bridge.

[216]

MARGAM TIN-PLATE COMPANY, *Taibach, Glamorgan*.—Tin and terne plates; sheet, bar, and iron, best charcoal quality.

The Margam Tin-Plate Company also exhibit a portfolio of various sizes of their NF brand of tin-plates.

[217]

MARLBOROUGH, DUKE OF, *Blenheim Palace, Woodstock*.—Specimens of iron ore from Fawler Mines, Charlbury, Oxfordshire.

[218]

MARSHALL, E. S., *31 John Street, Tottenham Court Road*.—Gold and silver leaf—illustrative of the malleability of metals.

[219]

MARTIN, E., & SON, *St. Austell*.—China clay and China stone.

[220]

MARTIN, REBECCA, *Higher Blowing House, St. Austell*.—Specimens of china clay and china stone.

The specimens exhibited are the finest qualities of china ware and porcelain; and also of the purest and best clay and china stone used in the manufacture of earthen- (kaolin) for bleaching and general purposes.

[221]

MATTHEWS, J., *Royston*.—Coprolites.

[222]

McCALL, ROBERT, *near Limerick*.—Fine magnetic iron ore, similar to that of Sweden, America, &c.

[223]

MEESON & Co., *Grays, Essex; George Yard*.—Manufactured and unmanufactured products of Grays Chalk Pits.

[224]

MEIK, THOMAS, *Sunderland*.—Model of the mode of shipping coals.

[225]

MERSEY STEEL AND IRON COMPANY, *Liverpool*.—Cranks, shafts, and other forgings.

[226]

MICHELL, R. R., & Co., *Marazion, Cornwall*.—Model of tin-smelting furnace. Moulds, tools, kettles, &c.

[227]

MICHELL, SARAH, *St. Austell, Cornwall*.—Decomposed granite or clay, washed and unwashed; also washed and prepared for market.

[228]

MICKLETHWAIT, RICHARD, *Ardsley House, Barnsley, Yorkshire*.—Three grindstones from the Old Oaks Quarry, Barnsley.

[229]

MITCHELL, WM. BRIGHTMORE, Mineral Surveyor, *16 Broom Hill, Sheffield*.—Coals; building, fire, and grinding stones; ironstones; minerals of South Yorkshire.

[230]

MITCHELL, WM. BRIGHTMORE, Mineral Surveyor, *Sheffield*.—Ores and other minerals of the High Peak district of Derbyshire.

[231]

MONA MINE COMPANY, *Amlwch, Anglesey, North Wales*.—Specimens of the produce of copper mining and smelting.

[232]

MONK BRIDGE IRON COMPANY, *Leeds*.—Yorkshire iron and minerals; patent combined cast steel and iron tyres.

[233]

MONTEIRO, L. A., 51 *Manchester Street, Manchester Square, W.*—A many-coloured stalagmite.

[234]

MOORE & MANBY, 3 *Billiter Square, London, and Dudley.*—Specimens of iron for engineers and others.

Trade mark.



Descriptions of manufactured iron of best qualities supplied by MOORE & MANBY :—

Flat bars from $\frac{3}{8}$ to 12 inches wide.

Round bars from $\frac{1}{8}$ to 8 inches diameter.

Square bars from $\frac{1}{8}$ to 5 inches.

Half round, feather and square edge to 6 inches wide.

Bevelled, octagon, hexagon, oval, moulding, and every other description of fancy iron.

Best, best best, and treble best rivet iron, plating bars, &c.

Hoop and strip iron from $\frac{1}{2}$ to 10 inches wide.

Sheets—single, double, and latten.

Roofing sheets—corrugated and galvanized iron.

Nail sheets and hoops, nail rods and flat slit rods.

Boiler plates—best, best best, and treble best ; all sizes.

Gasometer and tank plates ; all sizes.

Ship, bridge, girder, and flitch plates ; all sizes.

Ribbed and chequered foot plates ; all sizes.

Canada and tin-plates, coke and charcoal sheets, &c.

Trade mark.



Angle, equal and unequal sided, and double angle.

Tee, equal and unequal, and double tee.

Sash bars and trough iron of various sections.

Rolled girder, joist, and beam iron ; all sizes.

Bulb, bulb angle, bulb tee, and deck beam iron.

Fencing and telegraph wire, black and galvanized.

Contractors, permanent, bridge, and tram rails.

Locomotive, coach, carriage, and waggon tyres.

Locomotive and other fire bars of various sections.

Railway axles, forgings, and use iron of all descriptions.

Railway spikes, fish plates, bolts, &c.

Railway iron work and stores of every description.

Best Yorkshire iron supplied of the various brands.

Hot and cold blast melting and forge pig iron.

Rolls turned for irregular sizes according to agreement.

All information as to prices, &c., can be obtained at 3 Billiter Square, or Dudley.

[235]

MORCOM, J., *St. Austell, Cornwall.*—Manganese and iron ores.

[236]

MORE, F., *Linley Hall, Shropshire.*—Model of lead field. Ancient lead, spades, &c.

[237]

MOREWOOD & ROGERS, *Stratford, Essex.*—Sheets of iron and other metals for roofing, &c.

The space allotted to MESSRS. MOREWOOD & ROGERS is covered by a shed of their new PATENT CONTINUOUS GALVANIZED ROOFING SHEETS. This roofing, which combines lightness, strength, and durability, can be applied at less cost than common asphalted felts, and further recommends itself by the ease with which it can be applied by unskilled labour ; by the rapidity with which buildings can be covered with it ; and by the important fact that sheets can be made of any required length.

The great and special advantages which such a material possesses are obvious : any labourer on a farm, or in a

factory, who can use a hammer will be quite capable of applying this material, no greater skill being needed than if the building had to be covered with canvas or felt.

Corrugated sheets of Patent Continuous Metal for roofing or upright work can be supplied of any lengths up to twenty feet, without additional charge for extra length by the exhibitors, from whom licences may be obtained for working their patent. Applications should be addressed to MOREWOOD & ROGERS, Dowgate Dock, Upper Thames Street, E.C.

[238]

MORGAN, RICHARD, & SONS, *Llanelly, Carmarthenshire.*—Anthracite malting coal.

[239]

MOSER & SONS, *Southwark, London.*—Sections of rolled iron.

[240]

MOULDED PEAT CHARCOAL COMPANY, *Fenchurch Street, London*.—Charcoal; foundry blacking; iron and tin-plate specimens; peat products.

[241]

MUCKLESTON, E., THE REV., *Stoke Cobham*.—Stone from Whitesbourne quarry, Shropshire.

[242]

MURPHY, JOHN, *Penzance*.—Inkstand; pair of vases; figure of Apollo; pair of Indian vases, &c.

[243]

MURRAY, ADAM, 24 *New Street, Spring Gardens*.—Anthracite from Broadmoor and Landshipping.

[244]

MURRAY, THOMAS, *Chester-le-Street, Durham*.—Working model of underground steam-engine.

[245]

MUSEUM OF PRACTICAL GEOLOGY, *Jermyn Street*.—Model of Holmbush Mine, constructed by T. B. Jordan, Clapham.

[246]

MYLNE, R. W., 21 *Whitehall Place*.—Map,—tertiary and cretaceous districts,—France, England, &c., with contoured seas.

[247]

NEWALL, D. H. & J., *Granite Works, Dalbeattie*.—One monument and one fountain.



MONUMENT AND FOUNTAIN IN GRAY GRANITE.

[248]

NEWCASTLE, DUKE OF, K.G., *Shireoak Colliery, Worksop*.—Steam coal; ironstone in per-
mian strata; views of colliery.

[249]

NICHOLLS, JOHN, *Trekenning House, near St. Columb.*—Copper and lead ores from Freton Mine; slates from Penpethy Quarry, near Delabole; porphyry from quarries near Newquay.

- a. China stone from Trerice, St. Dennis, Cornwall.
- b. Manganese and iron ores from two lodes in Trerice, St. Dennis.
- c. Copper and lead ores from Trelow, in St. Issey, Cornwall.
- d. Three specimens of porphyry from quarries near Newquay, Cornwall; obtainable in blocks of enormous size.
- e. A block of trap stone, of exceedingly durable quality,

from a quarry on the manor of Cannalidgey, in Cornwall.

f. Hard Cornish slates, from Penpethy quarry (adjoining Delabole) near Camelford—"Princesses" and "Duchesses."

All the above are obtainable in large quantities from quarries and mines on land belonging to one exhibitor who is ready to receive applications for setts or licences.

[250]

NICHOLSON, MARSHALL, *Whittington Collieries, near Chesterfield.*—Stone curb, and arching for coal-shaft bottom.

[251]

NIXON, TAYLOR, & CORY, *Cardiff.*—Navigation steam coal supplied to H. M. yacht, Warrior, and Black Prince; and sections.

This coal is shipped at Cardiff, Newport, Swansea, Briton-Ferry, and Liverpool; it is wrought solely from the celebrated "Upper Four Feet Seam," in the Aberdare Valley, which is the best steam coal in the world: and is shipped by Nixon, Taylor, & Cory, of Cardiff.

It is used on board Her Majesty's yacht; the frigates Warrior and Black Prince; and by the Cunard Line; the West India Royal Mail Company; the Peninsula and Oriental Company; the Hamburg and New York Company; the Liverpool and Montreal Ocean Steam Ship Company; the London and St. Petersburg Company, &c., &c. Reference can be made to any of these companies.

One pound of this coal has been found to evaporate more than 10 lbs. of water. It burns freely without smoke; is perfectly clear from iron pyrites, clod, shale, or other impurities; so much so that the engineer of the Atlantic Royal Mail Company's steamer, Prince Albert, during her passage of eight days from Galway to St. John's, Newfoundland, had only to clean the boiler fires twice.

This coal possesses a further advantage, viz., that the small that may be caused by breakage in transit will coke, or adhere sufficiently, so as when thrown into the furnace, to prevent its falling through the fire bars to waste. This quality of the Aberdare Steam Coal is unusual and most valuable.

Section of seams or beds of coal in the Aberdare Valley and Merthyr districts, in the order in which they occur in the section of the coal fields. The nine seams are mixed indiscriminately, and shipped and sold by other colliery proprietors under one name, as if of uniform quality.

	Thickness.
	ft. in.
1. Graig coal	2 6
2. Gothloon coal	4 0
3. Yard coal	2 9
4. "Upper four feet coal"	6 0
5. Six feet	4 0
6. Red coal	2 9
7. "Nine feet coal"	10 6
8. Dirty coal	4 0
9. Seven feet coal	7 0
Total thickness of coal	43 6

After the "Upper four feet" coal, the seam called the "Nine feet" is the best steam coal in the above section: the whole of the others are very inferior in quality.

[252]

NORTH GUNBARROW CHINA CLAY COMPANY, *Newton Abbott.*—Porcelain clay, &c.

[253]

NORTHUMBERLAND, DUKE OF, K.G., *Alnwick Castle.*—Five pieces of freestone, from Alnwick, Denwick, Rothbury, Harlow, Hill and Thorngrifton Quarries, all in the county of Northumberland.

[254]

NOWELL & ROBSON, Stone Merchants, *Summerleys, Idle, near Leeds.*—York landings, paving and block stone.

[255]

OAKES & Co., *Alfreton, Derby.*—Coal and iron.

[256]

OKEY, S. F., & Co., *Castleford Iron Works*.—Coal; coke; bricks; Lincolnshire iron ore and iron.

[257]

ORD & MADDISON, *Darlington*.—Specimens of lime, limestone, paving stone, road stone, ironstone, building stone, millstone, and marble.

[258]

OXLAND, ROBERT, 42 *Park Street, Plymouth*.—Model of the furnace used in dressing tin ores containing wolfram; a series of natural and artificial compounds of tungsten.

[259]

PACKARD, EDWARD, & Co., *Ipswich*.—Specimens of coprolites, fossil bones, and superphosphates of lime manufactured therefrom.

The following are exhibited :—

Coprolites (so called) and fossil bones and remains of animals, from the Upper Green Sand, washed and reduced to a fine powder ready for treating with acid, containing 60 per cent. of phosphates. Price 50s. to 55s. per ton.

The Suffolk Craig variety of mineral phosphates, which form the cheapest source of phosphates yet dis-

covered, similarly prepared, yielding 56 per cent. of phosphates. Price 45s. to 50s. per ton, according to the demand.

Super- or bi-phosphate of lime, manufactured from the above, well adapted to root cultivation. Price 80s. to 90s. per ton, according to quality.

[260]

PALMER, C. M., *Newcastle-on-Tyne*.—Specimens of coke.

[261]

PARK-END COAL COMPANY, *New Fancy Pit*.—Park-end high delf and smith coal.

[262]

PARKINSON, JOHN, 81 *Cheapside*.—Devonshire minerals from the parishes of Ashburton and Ilstington, Dartmoor; Bethell's anthracite coke; Dr. Smith's patent peat fuel, fire igniters, deodorizing pastilles, pipes, &c.

[263]

PARKSIDE MINING COMPANY, *Whitehaven*.—Hematite iron ore, with section showing stratification of ore and superincumbent strata.

[264]

PATENT METALLIC FUSE COMPANY, *Wadebridge*.—Metallic safety-fuses for blasting; waterproof, and will not "hang fire."

These fuses are adapted for all blasting purposes: they are more economical, surer in action, and afford greater protection to life and limb than the previous fuses, which often explode uncertainly, and spoil by damp. They

were tested in blasting operations before the Miners' Association of Cornwall and Devon at the Royal Cornwall Polytechnic Exhibition, and obtained the Society's prize medal.

[265]

PATENT PLUMBAGO CRUCIBLE COMPANY, *Battersea Works, S.W.*—Crucibles for melting brass, steel, and other metals; portable furnaces and other requisites for assayers and dentists. (See page 23.)

[266]

PAULL, JOSEPH M., *Alston, Cumberland*.—Ores of iron, lead, copper, and zinc, as extracted; improved cage for the use of miners.

[267]

PEAKE, SAMUEL, *Berwig Quarry, Minera, Wrexham, and Whitsburn Quarry, Salop*.—Stone for building and paving purposes.

[268]

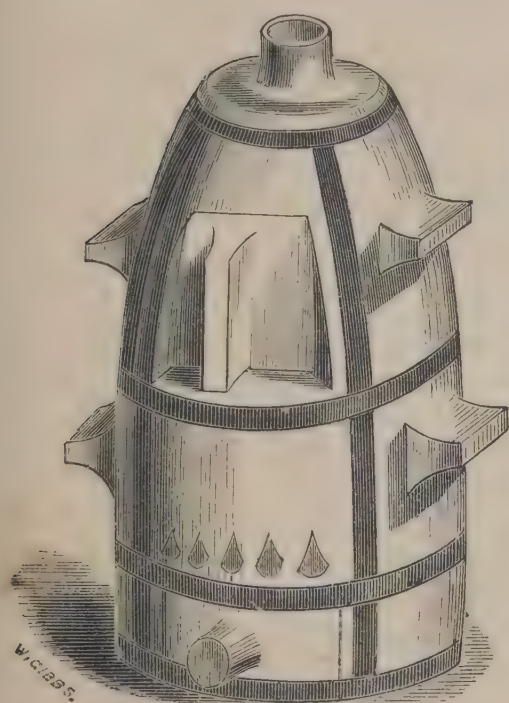
PEARCE, WILLIAM, *Truro*.—Candelabrum in serpentine, &c.; granite pedestal, made from part of the boulder used for the Duke of Wellington's sarcophagus.

[269]

PEARCE, W., Jun., *Boscawen Bridge, Truro*.—Inlaid serpentine and steatite tables, column mausoleum, and dolphin tazza.

PATENT PLUMBAGO CRUCIBLE COMPANY, *Battersea Works, S.W.*—Crucibles for melting brass steel, and other metals; portable furnaces and other requisites for assayers and dentists.

No. 1.



Furnace for melting Metals.

No. 3.



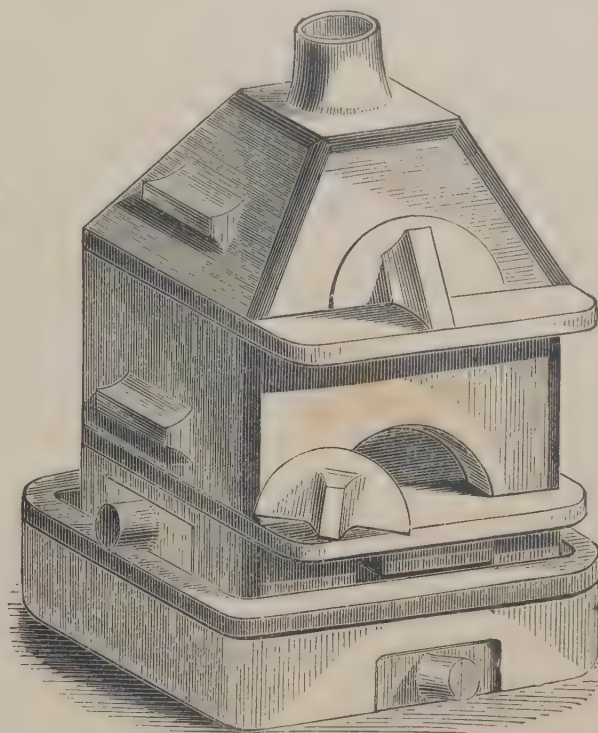
Muffle.

No. 4.



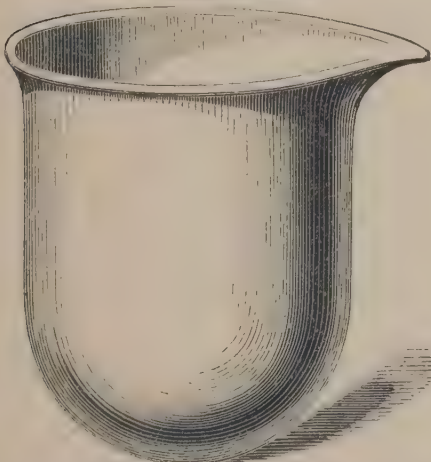
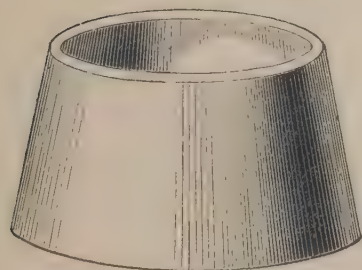
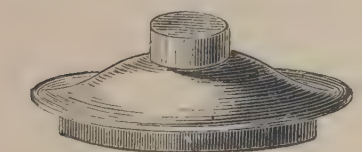
Assay, or Annealing Crucible.

No. 2.



Muffle Furnace, for Assayers, Dentists, Enamellers, etc.

No. 5.



Patent Plumbago Crucible, Cover, and Muffle for melting silver, as used in the various Royal Mints.

No. 6.



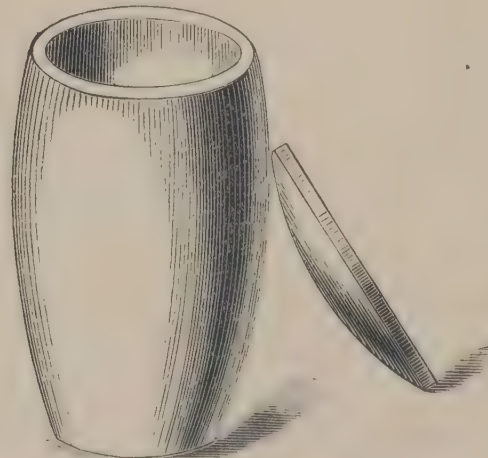
Scorifier.

No. 7.



Patent Plumbago Crucible and Cover, for melting Gold, Silver, Brass, etc., These melt on an average forty pourings. and are made of any shape and size, to hold from 1 to 1,000 lbs.

No. 8.



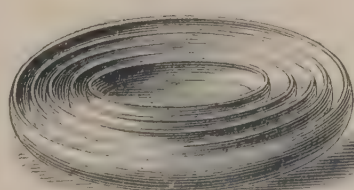
Patent Plumbago Crucible for melting Steel, malleable Iron, etc.

No. 9.



London Clay Crucible, round or square, for refining Gold.

No. 10.



Roasting Dishes.

No. 11.



Skittle pots, for purifying Jewellers' sweep.

The above may be seen at the Company's Stand, in Class I.
Price Lists and Testimonials free on application to the works as above.

[270]

PEARSON, EMMA MARIA, 11 *The South Quay, Great Yarmouth*.—Amber, jet, agates, jasper, chalcedony, and petrifications.

The pebbles, &c., exhibited in this case were found on the beach between Great Yarmouth and Caistor. They are found, especially jasper, in great profusion on that coast, and several fine collections exist in the town of Yarmouth. The specimens exhibited are merely average examples of what may be gathered every low tide.

[271]

PEARSON, WILLIAM, *Heddon Quarry, Northumberland*.—Freestone suitable for building purposes, such as docks, piers, bridges, houses, &c.

[272]

PEASE, J. & J. W., *Darlington*.—Model of Upleatham ironstone mines; Cleveland iron, ironstone, limestone, &c.

[273]

PERRENS & HARRISON, *Stourbridge*.—Stourbridge clays, burnt and in the raw state; retort and fire-bricks, ordinary make.

[274]

PHILLIPS & DARLINGTON, 26 *Gresham Street, London*.—Patent fuel, from partially coked or torrefied coal.

[275]

PHILLPOTTS, I., *Newport, Monmouthshire*.—Risca black vein steam coal; miners' tools.

[276]

PHIPPARD, THOMAS, *The Priory, Wareham, Dorset*.—Pottery clays, and sands for glass from Carey, Wareham, Dorset.

[277]

PIKE, W. & J., *Wareham, Dorsetshire*.—Clays for fine pottery, &c.

[278]

PIRNIE COAL COMPANY, *Leven, Fife, N. B.*—Cannel coal, suitable for oil or gas manufacture.

The cannel coal, found in the PIRNIE colliery, near Leven, Fifeshire, is highly suitable for the manufacture of oil and gas. The brown part is 8 inches, and the black 16 inches in thickness. By chemical analysis the former is found to yield 78·75, and the latter 59·17 gallons of crude oil per ton. The first named gives 13,500 cubic feet of 28-candle gas; and the average yield of the whole seam is 10,800 cubic feet of 20-candle gas per ton. Full particulars may be learned by applying to the agent at the colliery.

[279]

POLGLAZE & VICTOR, *Wadebridge*.—Metallic safety fuses.

[280]

POLKINGHORNE, W., *Tywardreath, Cornwall*.—A synopsis of the Cornwall ticketings for copper ores, from 1800 to 1860.

[281]

PORT NANT GRANITE COMPANY, *Pwllheli, North Wales*.—Piers, and permanently-rough pavement for bridges.

[282]

PORTER, WILLIAM, 21 *Pitt Street, Old Kent Road*.—Porter's patent millstones. Advantages: durability and perfection of joints.

[283]

POTTER, ADDISON, *Newcastle-on-Tyne*.—Fire-clay gas-retorts, blast-furnace lumps, and fire-bricks.

[284]

POWELL, THOMAS, & SONS, *Cardiff*.—Coal, and plan of colliery.

[285]

POWELL, WILLIAM JOHN, *Tisbury, Wilts*.—Specimens of coralline, flint, &c., from the oolites of Tisbury, Wilts.

[286]

PRICE, DR. DAVID SIMPSON, F.C.S., &c., Consulting Chemist, &c., 26 *Great George Street, Westminster*.—Iron, iron ores, &c.

Specimens illustrating the manufacture of iron in the most important districts of Great Britain, with analyses of the specimens.

[287]

PULLING, ROBERT & WELLINGTON, 10 *New Broad Street Mews, London*.—Iron nuts, screws, spikes, bolts, &c., for railways.

Iron.

Hexameter, square, and rose-head bolts with round and square necks with screws.
Holster-pin and box for rolling-mills.
Wood screws, dog-head spikes.
Hook and drawing spikes.
Iron rivets.

R. & W. P. Crown Iron.

Hoop, sheet, bar.
Boiler plate.
Nail rod.

[288]

PURIFIED FUEL COMPANY (Limited), 16 *George Street, Mansion House*.—Block fuel obtained from coal, from which a portion of the liquid distillates have been eliminated, and which possesses a higher evaporative power than ordinary coal.

[289]

QUEENSGATE WHITING COMPANY, *Beverley, Yorkshire*.—Fine, hard, and soft Paris white.

[290]

QUILLIAM, THOMAS, *Castletown, Isle of Man*.—Specimens, finished and unfinished, of Manx marble and stone.

[291]

RAMSAY, G. H., & SONS, *Derwenthaugh, Newcastle-on-Tyne*.—Fire-clay retorts, for gas-making; fire-clay goods of various descriptions; cannel coal, coke, and coking coal.

[292]

RAY, JOHN, Esq., *Kilburne Colliery, Derby*.—Specimens of Kilburne coal and ironstone.

[293]

RAY, J., *Ulverstone*.—Slates.

[294]

RAYNES, LUPTON, & Co., *Liverpool*.—Sets and channel stone for paving streets, from Penmaenmawr, Carnarvonshire.

[295]

READWIN, T. A., F.G.S., *Stretford, Manchester*.—British gold ores.

[296]

REDRUTH LOCAL COMMITTEE, *Redruth, Cornwall*.—Mineral produce of West Cornwall.

[297]

REID, P. S., *Felton Colliery, Chester-le-Street*.—Improved underground ventilating furnace.

[298]

RENWICK & NICHOLSON, *Newcastle-on-Tyne*.—Coal and coke from Broom's colliery.

[299]

RHIWBRYFDIC SLATE COMPANY, *Portmadoc*.—Roofing slates.

[300]

RHORYDD SLATE COMPANY, *Portmadoc*.—Roofing slates and ridges.

[301]

RHOS COLLIERY COMPANY, *Llanelly*.—Anthracite coal.

[302]

ROBINSON & SON, *Stanhope, Darlington*.—Section of Weardale strata.

[303]

ROBINSON, WALTER, & Co., *Gospel Oak Works, Tipton*.—Sheet iron, black, tinned, galvanized; tinned, and the tinned galvanized, both flat and corrugated.

[304]

ROBSON, ROBERT, *New Town Hall, Newcastle-on-Tyne*.—Specimens of freestone, Wideopen, Kenton, and Brunton Quarries.

[305]

ROGERS & RAWLINGS, *Bradford-on-Avon*.—Font in Bath stone, and model of part of the interior of Bemerton church.

Carved font, in Bath stone, from the Bethell Quarries, Bradford-on-Avon, Wilts. Designed by C. F. Hansom, Esq., Clifton, and executed by Mr. W. Farmer.

This font is exhibited by the proprietors of the quarries, for the purpose of illustrating the capabilities of the stone, for carving and building purposes.

[306]

ROGERS, E., *Abercarn*.—Iron ores, plans and description.

[307]

ROGERS, P., *Swansea*.—Enamelled slates and marble.

[308]

ROSS OF MULL GRANITE COMPANY, 35 *Parliament Street, S.W.*—Polished red granite, marble; also rough blocks.

The specimens exhibited are from the island of Mull, Argyllshire, where there are four magnificent quarries which the Granite Company have just opened out, and are now working extensively. Blocks of the largest size, suitable for docks and other similar works, can be procured with ease and at small expense. The specimens of

red granite are equal to the best marbles for all polishing purposes, and are admirably adapted for works of an ornamental character. Information may be obtained by application to Captain Copeland, the company's agent, at the above address.

[309]

RUDDOCK, SAMUEL, 22 *Bloomfield Terrace, Pimlico, S.W.*—Statuette of St. Agnes.

[310]

RUSSELL, JOHN, *Newport, Monmouthshire*.—Steam, coking, and household coal, from Tyr Nicholas Colliery, Cwm Tylery.

The analysis of these coals will be seen on reference to a list reporting upon all coals in use for Her Majesty's Navy, as ordered by the House of Commons on the 30th June, 1858; and they will be found to stand highest for their evaporative power, and the very small quantity of clinker. These coals are now being used under contract for the navy at Portsmouth, Plymouth, and foreign stations.

The results of the experiments are as follows:—

1. The New Black Vein.

Water evaporated for each 1 lb. of coal consumed, calculated from 100 degrees constant temperature of feed-water, 9·56 cubic feet.

Water evaporated per hour, calculated from the same temperature, 50·67 cubic feet.

Per centage of clinker, 0·79.

Per centage of ash, 5·75.

They possess a high per centage of carbon with only a trace of sulphur; white ash, and are perfectly free from anything injurious to bars or boilers. Burning brightly and

getting up steam easily, they possess this advantage, that the small will get up steam as well as the large, and it makes an excellent coke for locomotives and all other smelting purposes.

These coals are shipped at the exhibitor's wharf, or in the very commodious docks at Newport, Monmouth, where vessels of the largest class can load at all times with perfect safety.

2. The New Rock Vein.

Analysis by Dr. Percy:—

Carbon	..	..	..	89·81
Hydrogen	..	..	..	5·19
Oxygen and Nitrogen	..	..	..	5·00
				100·00

In the middle of this coal a live frog was found at the depth of 600 feet, March 10th, 1862.

[311]

SALT CHAMBER OF COMMERCE, *Northwich*.—Rock salt, marine salt, and other manufactured salt of various countries.

[312]

SALTER, J. W., 28 *Jermyn Street*.—Geological map, coloured on a new principle.

[313]

SANDERS, WM., 21 *Richmond Terrace, Clifton, Bristol*.—Coals and iron ores.

[314]

SCARTH, W. T., *Raby Castle, Darlington*.—Freestones, limestones, basalt, ironstones, lead ore, flag and slate from Teesdale district.

[315]

SCHLESINGER, JOSEPH, *George Street, Birmingham*.—Turkish emery on cloth and paper, and specimen of its manufacture.

[316]

SCHNEIDER, HANNAY, & Co., *Barrow in Furness*.—Model of blast furnaces for smelting hematite iron ore.

[317]

SCHULL BAY COPPER MINING COMPANY, 33 *Great Winchester Street, London, E.C.*—Malachite, and other copper ores.

[318]

SCOTTISH IRONMASTERS: Baird, W., & Co.; Merry and Cunningham; Dixon, W. S.; Houldsworth & Co.; Wilson's trustees; Addie, R.; Wilsons & Co.; Dunlop & Co.; and others, *Glasgow*.—Ironstones from which Scotch pig-iron is made; also specimens of pig iron.

[319]

SEAFIELD, EARL OF, *Cullen House*.—Serpentine, steatite, graphic-granite, asbestos, from Portsoy; Cairngorm crystals from Strathspey.

[320]

SECCOMBE, JAMES, *Pendowry, Liskeard, Cornwall*.—Crystallized oxide of copper.

[321]

SEWELL, EDWARD, *Fulneck, Leeds*.—Topographical and sectional model of Tong ironstone field, west of Leeds, Yorkshire.

[322]

SHELTON BAR IRON COMPANY, *Stoke, Staffordshire*.—Samples of boiler-plate and manufactured iron.

[323]

SHEPHERD, T., *Bath*.—Crossway stone.

[324]

SHEPHERD & EVANS, *Aberdare*.—Smokeless Curnamman Merthyr steam coal.

[325]

SHIELD & DINNING, *Langley Lead Works, Haydon Bridge*.—Lead ores, lead smelting and refining.

MESSRS. SHIELD DINNING exhibit specimens of lead ore, lead, litharge, silver, &c., for the purpose of illustrating the process of lead-ore smelting and refining.

[326]

SIM, W., *Granite Works, Glasgow*.—Specimens of granite from the rough block, to the highest class of polished work. (*Nave*.)

[327]

SIMON, LOUIS, *Springfield Works, Nottingham*.—Bronze powder, varnish, and printing-ink.

[328]

SIMPSON, OCT. N., *Little Casterton Freestone Quarry, near Stamford*.—A perfect oolite, which will stand any weather.

[329]

SLATER, D., *Whitley*.—Rough jet.

[330]

SMAILE, R., & Co., *Newcastle-on-Tyne*.—Pressed crucibles.

These crucibles are composed of Stourbridge clay and other pure materials, and are manufactured by pressure in moulds, whereby equality in size, thickness, and solidity are insured. They are made in sizes holding from 15 to 400 lbs. weight; will bear the fusion of copper and

other metals, high degrees of heat, and sudden changes of temperature, and can be used for several consecutive days. They are now in regular use in the principal foundries in the north of England, and other parts of the country.

[331]

SMITH, E. J., *Gateshead*.—Stones.

[332]

SMITH, RICHARD, *The Priory, Dudley*.—Minerals; hot and cold blast pig iron, and manufactured iron.

[333]

SMITH, SYDNEY, Marble Turner, *Ashford, near Bakewell*.—Three black Derbyshire marble vases, with handles.

[334]

SOPWITH, THOMAS, 43 *Cleveland Square, W.*—Illustrations of lead-mining from the Allenhead mines.

[335]

SOWERBY & PHILLIPS, *Newcastle-upon-Tyne*.—Waldridge Wallsend Hutton seam, gas, and smiths' coal. (*See page 29.*)

[336]

SPARK, H. K., *Darlington*.—Coal, coke, ironstone, iron, and fire-bricks.

[337]

SPARKS, W., *Crewkerne, Somerset*.—Stone and limestone.

[338]

SQUIRES, C., & SONS, *Stourbridge*.—Model of glass-house furnace, &c.

[339]

STAINIER & SON, *Silverdale, Newcastle, Staffordshire*.—Bars for ships' knees.

[340]

STARK, J. C., *Torquay*.—Devonshire marbles.

[341]

STICK, H., & Co., *Swansea*.—Tin-plates and iron.

[342]

STICKLEY, J., *Cross Street, Hatton Garden*.—Leaf gold, and other beaten metals.

[343]

STRATON & CARGILL, *Arbroath, Forfarshire*.—Polished and dressed pavement.

[344]

SUNDERLAND LOCAL COMMITTEE, 13 *Bridge Street*.—Model of docks and harbour entrance.

SOWERBY & PHILLIPS, *Newcastle-upon-Tyne*.—Waldridge Wallsend Hutton seam, gas, and smiths' coal.

The exhibitors being the proprietors of the Waldridge Wallsend Colliery, desire to call the attention of gas companies and exporters to their Waldridge Wallsend Hutton Seam gas coals, acknowledged to be the best portion of the Hutton Seam in the county of Durham.

It possesses the necessary elements for obtaining the largest yield of gas of high illuminative power, and also produces a first-class coke; it is used and much approved of by nearly all the principal European gas companies.

By the system of screening adopted by MESSRS. SOWERBY & PHILLIPS, the gas coals designed for shipment to foreign ports are freed from all impurities; thus increasing the yield of gas, and completely avoiding a great waste in quantity, and consequent loss in freight, particularly where overland carriage from the port of delivery is necessary.

The Waldridge small coal will be found to be the best now in use for smiths' purposes, being perfectly free from sulphur. It is extensively used, and its qualities are well known in nearly all the continental ports.

SOWERBY & PHILLIPS are in a position to ship coals at Shields and Sunderland Dock (at which ports vessels of the largest size are always afloat while loading), and possessing by their own railway, a direct communication with the line of the North-Eastern Railway Company, they can when necessary despatch coals by the most direct and speedy route to all parts of the country.

"Newcastle-on-Tyne, 14th Feb., 1862.

"Messrs. Sowerby & Phillips,

Proprietors of Waldridge Colliery.

"Dear Sirs—It is with the greatest pleasure that we testify to the excellent quality of your Waldridge Wallsend coals for coke and gas, from the great satisfaction which they have given at numerous gas works, during our uninterrupted export of several thousand tons per annum, since 1845.

"We are,

"Yours very truly,

"C. F. JACKSON & Co.,

"Coal exporters, Exchange Buildings,

"Newcastle-on-Tyne."

(Copy.)

"Lyons, 21st Feb. 1862.

"I, the undersigned Augustus Genin, administrative Engineer of the Gas Companies whose head establishment is at Lyons, have pleasure in certifying that for fourteen years, I have always preferred for the supply of our works situated in France, Spain, and Italy, the Waldridge Coal, and that I have obtained from it the best product.

"This coal which was at first pointed out to me by my friend, Mr. J. B. Stears, has been supplied in preference by the house of C. F. Jackson and Co., of Newcastle.

"Accept my friendly wishes,

(Signed)

"AUG. GENIN."

(Copy.)

"Lyons, 6th March, 1862.

"I certify that having for a dozen years employed in those of our gas works situated so as to be supplied by English collieries, the coals from the Waldridge pit, I acknowledge that according to their yield of gas and coke, they are equal in quality to the best gas coal from the Newcastle basin.

(Signed)

"EMELIE VAUTIER,

"Engineer of the Gas Companies of the towns of Besancon, Bourg, Dole, Metz, Reims, Angers, Limoges, Clermont, Ferrand, le Puy, Montauban, Perpignan, Agen, Alais, Valence, Grenoble, Venice, Trieste, Padoue, Vincenne, Treviso, Verone, Florence, Malaga.

"Viewed for authentication of the signature placed above,

Lyons, 7th March, 1862.

(Signed) "The Mayor of the Second District,

"PUVONOT."

(Seal.)

[345]

SUTTON & ASH, *Snow Hill, Birmingham*.—Patterns of sections of rolled iron. (*See page 30.*)

[346]

SWANSEA LOCAL COMMITTEE.—Copper, silver, iron, zinc, and nickel ores, and metals.

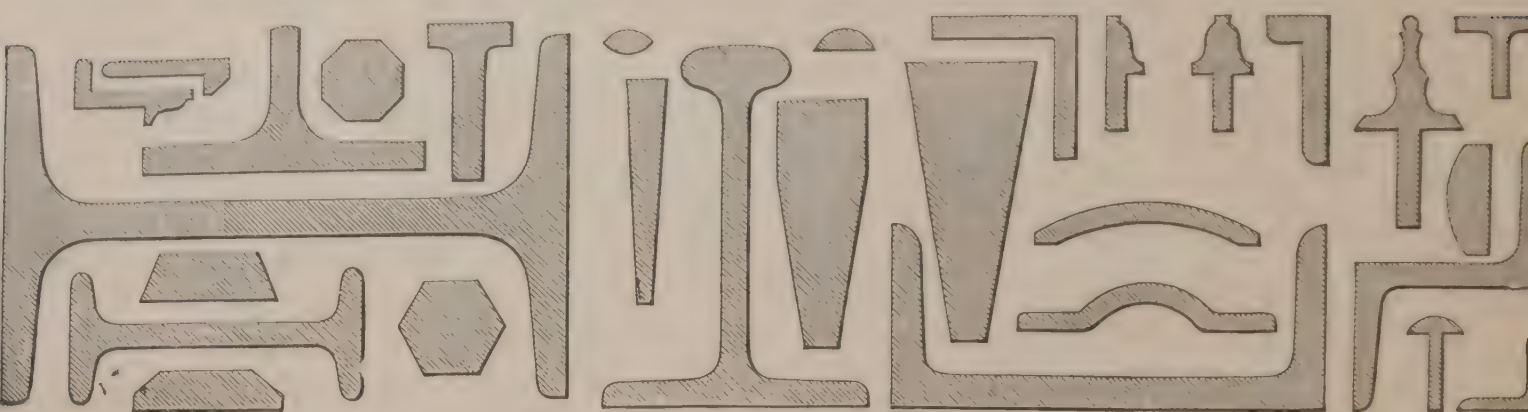
[347]

SWEETLAND, TUTTLE, & Co., *55 Old Broad Street, and Britonferry, Wales*.—Specimens illustrative of the manufacture of copper.

[348]

TASKER, THOMAS, *Billinge Hill Quarry, near Wigan*.—Scythe-stones, and grindstones for steel grinding.

SUTTON & ASH, *Snow Hill, Birmingham.*—Patterns of sections of rolled iron.



The following sections are rolled in many sizes and various thicknesses :—

Rolled iron girders, for fire-proof buildings, to 18 in. ; flat bars, to 12 in. ; rounds to 8 in. ; square, to 5 in.

Bevelled, half-round, oval, octagon, hexagon, fire, sash, and patent shoe bars ; angle, tee, rivet, cable, and boat guard iron. Fencing and drawn wire. Single, double, and latten sheets. Boiler-plates, hoops, strip, nail rods, galvanized iron, and corrugated sheets for roofing.

Ship and boat knees, cart-arm moulds, and all kinds of hammered iron.

Lowmoor plates, bars, angle, rivet iron, &c., &c.

Every description of melting iron, hot and cold air, in Staffordshire, Shropshire, Welsh, and Scotch, of the most approved brands.

Sheets of sections will be sent on application.

[349]

TAVISTOCK COMMITTEE, *Tavistock* (J. Matthews, Secretary).—Copper, tin, lead, iron, and other ores ; building stones, clay, &c.

[350]

TAYLOR, BROTHERS, & Co., *Leeds.*—Tyres, cranks, axles, &c.

[351]

TAYLOR, H., *Coal Trade Office, Newcastle-on-Tyne.*—Plans and sections of coal-fields of Durham and Northumberland.

[352]

TEAGUE, MARTIN, *St. Paul, Penzance.*—Obelisk from the same granite block as the monument to “Dolly Pentreath.”

[353]

TERRET, J., *Coleford, Gloucestershire.*—Brick tiles and pipes.

[354]

THOMAS, HENRY, *Lisburne Mines, Cardiganshire.*—Lead ores.

[355]

THOMAS, HENRY.—Silver-lead ore from Glogfach mine, Cardiganshire.

[356]

THOMAS, HENRY.—Silver-lead ore from Log-y-las mine, Cardiganshire.

[357]

THOMAS, HENRY.—Silver-lead ore from Frongoch mine, Cardiganshire.

[358]

THOMAS, HENRY.—Silver-lead ore from Cwmystwith mine, Cardiganshire.

[359]

THOMAS, HENRY.—Silver-lead ore from Cefn-cwm-brwyns mines, Cardiganshire.

[360]

THOMAS, HENRY, *Lisburne Mines, Cardiganshire*.—Silver-lead ore from Goginan mines, Cardiganshire.

[361]

THOMAS, HENRY.—Silver-lead ore from Cwm-Erfin mine, Cardiganshire.

[362]

THOMAS, HENRY.—Silver-lead ore from East Darren mine, Cardiganshire.

[363]

THOMAS, HENRY.—Silver-lead ore from Nanty mine, Montgomeryshire.

[364]

THOMPSON, HATTON, & Co., *Bilston*.—Iron and tin-plate articles.

[365]

THOMPSON, WILLIAM, 11 *Elmer Street, Grantham*.—Specimens of Ancaster freestone and rag.

The specimens exhibited are produced on the original "Estate for general building purposes."

[366]

THWAITES, J., *Bristol*.—Specimens illustrative of Mitford's new method of cutting precious stones.

[367]

TOMLINSON, ABEL, *Bakewell, Derbyshire*.—Oblong inlaid marble table; oblong marble specimen table, geometric design.

[368]

TONKIN, J., *Pool, Cornwall*.—Section of tin and copper lode Dolcoath, in stone.

[369]

TOWNSHEND, WOOD, & Co., *Swansea*.—Railroad, bar, and sheet iron, tin, terne, and black plates.

[370]

TRASK, CHARLES, *Norton-sub-Hamdon, near Ilminster, Somerset*.—Specimens of ham stone.

[371]

TRICKETT, GEORGE, 21 *Cannon Street, E.C.*—A burnt iron column.

[372]

TRICKETT, SAMUEL, Stone Merchant, *Isle of Dogs*.—Specimens of stones, granite, and marble, for building, paving, and monumental purposes.

[373]

TRICKETT & HOLDSWORTH, Quarry Owners, *Horsforth, near Leeds*.—Bramley Fall stone, for docks, bridges, and basement course of large buildings.

[374]

TROTTER, THOMAS, & Co., *Winnalls Hill, near Coleford*.—Lathe-turned columns. Ashlar, sawn and planed, from Brixdale quarries. Coal.

[375]

TRUSCOTT, CHARLES, & Co., *St. Austell, Cornwall*.—China clays, china stones, and bleaching clays.

[376]

TUFFLEY, MRS. ESTHER, *Avening, near Stroud, Gloucestershire*.—Model of a staircase in Painswick stone.

[377]

TURNBULL, M., Jun., *Tranwell, Morpeth, Northumberland*.—Specimen of freestone.

[378]

TURNER, CASSONS, & Co., *Portmadoc*.—Slates and slate slabs.

[379]

TURNER, JAMES, 1 *Hall Bank, Buxton*.—Derbyshire marble vases and tables, inlaid with various marbles.

[380]

TYLER, JAMES WILLIAM, 4 *Wood Street, Westminster*.—Improvements in the manufacture and laying of pure thick zinc.

Improvements in the manufacture and laying of sheet zinc, as applied to building and roofing purposes. Models of construction, and method adopted to allow of free contraction and expansion, without confining the sheets with	nails or solder. Specimens showing the pure and marketable quality of the metal used, from the purest mines of the <i>Vielle Montagne Company</i> .
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[381]

TYM, JOHN, *Castleton, Derbyshire*.—Specimens of fluorspar, or blue-john vases, candlesticks, chalices, thermometer, &c.

[382]

USWORTH COLLIERY, OWNERS OF, *Usworth, Washington, Durham*.—Freestone.

[383]

VIGRA AND CLOGAN MINING COMPANY.—Gold, and gold ores from *Merionethshire*.

[384]

VINT, GEORGE, & BROTHERS, *Idle, near Leeds*.—Obelisk in stone from their *Gazeby* quarries.

[385]

VOSS, JAMES, *Woodyhide, Corfe Castle, Dorset*.—Purbeck marble.

[386]

WAGSTAFFE & Co., *Fremator Quarries, near Tavistock*.—Pedestal of granite, 4 feet 8 inches by 16 inches.

[387]

WALCOTT, GEORGE, 24 *Abchurch Lane*.—Gas retort bed, full-size set of six.

[388]

WALKER, DAVID, Quarrier and Pavement Merchant, *Turin Hill Quarries, near Arbroath*.—*Arbroath* pavement, or flagstones manufactured.

[389]

WARING, CHARLES HENRY, *Neath*.—Miners' safety-lamps, which cannot be opened without first extinguishing the light.

[390]

WARNER, A., 31 *Threadneedle Street*.—Iron treated by chemical processes.

[391]

WARNERS, LUCAS, & BARRETT, *Norton Furnaces, near Stockton-on-Tees*.—Samples of pig iron and railway chairs.

[392]

WATSON, HENRY, *Newcastle-on-Tyne*.—Safety-lamps used in the coal-mines of *Northumberland* and *Durham*.

[393]

WAYNE, T., *Aberdare*.—Iron.

WEARDALE IRON COMPANY, *Tudhoe and Tow Law Iron Works, Ferryhill, Durham.*—Iron, steel, and their minerals.

[Obtained a First Class Medal at Paris, 1855.]

Specimens of spathose iron ore, brown ore, coke, pig iron, bar iron, boiler-plates, hoops, wire, cast steel, axles, wheel tyres, cranks, &c. &c.

The whole of the specimens of pig, or cast iron, exhibited by the WEARDALE IRON COMPANY, as well as all their specimens of malleable iron and steel, have been produced from the ores of Weardale, a valley of the county of Durham, extending westward from near the city of that name, to the springs which form the sources of the river Wear at the western boundary of the county, where it is separated from Cumberland by the mountain ridge which looks down on Nenthead and Alston Moor.

The geological formation is the carboniferous, or mountain limestone, series, and the space through which the ore is found, in separated veins and masses, extends about fifteen miles from east to west; its average width being, from north to south, about six or seven miles.

The ores are all of the same general nature, consisting of the spathose, or sparry carbonate of iron, sometimes in a highly crystalline condition, and exhibiting distinctly the usual forms of its crystallization, and sometimes more compactly aggregated, and exhibiting those forms less visibly. It is certain that the ores of Weardale have been all deposited in this state of sparry carbonates; but in very many places, where the superjacent and contiguous rocks and soil have been much shattered and dislocated by the passage and intersection of veins or troubles, the carbonic acid has been expelled from the ore, and has been replaced by oxygen through atmospheric access, and the ore has passed into the state of a *brown hematite*, *i. e.*, into hydrated peroxide of iron. Generally in such cases it has become impoverished by the infiltration of earthy matter suspended in the percolating water, and by being permeated by the altered ore, which, when first altered, is brought into a pasty or semi-fluid state.

The specimens of highly crystalline and silvery white iron, exhibiting large lamellar plates or planes of great brightness (labelled A) are called "*silvery steel pig iron*." It is in fact and strictly *steel*, and steel, too, of great purity; although from its hardness, and also from its tendency to cleave in the direction of the larger plans, rendering it not malleable, it cannot be used as steel.

At the moment when, after reduction from the state of ore to that of metal, it first passes into fusion, it is entirely malleable and is good steel, but afterwards changes with great rapidity, the greater in proportion to the degree of heat, and passes into the state of the specimens exhibited.

The ores are smelted at Tow Law, in Weardale, with coke made from the coal found there, which is of great purity, and this silvery steel pig iron is produced from the finest of these crystallized ores, selected for the purpose, specimens of which are exhibited and labelled correspondingly with the letter A.

This peculiar variety of iron is the same as is made and used in Germany from the same kind of ore, and known there by the name of *spiegel eisen*, or *specular iron*, and the chemical analysis, which will be found below, of one of these English specimens, and of the German one, which will be found along with them, and which is labelled for the purpose of distinction B (but which is stated to have been smelted not with *ccke*, but with *charcoal*), will serve to show that they are, notwithstanding, as identical in composition, as they obviously are in their external characters.

The other specimens of cast iron exhibited, are of *grey pig iron*, as generally made from the same Weardale

ore, but taken as it comes from the mine, or of its ordinary or average quality. It consists, however, chiefly of a more compact or less highly crystalline variety of the sparry carbonate, of which some specimens are shown and labelled C, the same letter being also used to mark these specimens of iron. These specimens comprise the qualities usually distinguished as No. 1 and No. 3, as used for foundry purposes, *i. e.*, for re-melting and re-casting into various forms of what are called cast metal goods. They also comprise the quality called No. 4; which is also partially used for the same purpose, but which is chiefly employed in the "*puddling*" process; *i. e.*, for conversion into malleable iron and steel. For these purposes it is not quite equal, but yet *not greatly inferior* to the *silvery steel pig iron*; and the whole of the iron produced from these Weardale ores possesses a peculiar fitness for making steel of a superior quality, in a degree very far beyond the produce of ores, of much greater richness, as regards the quantity of iron they contain. In fact they may be called, and considered as distinctively *steel ores*.

A portion of the brown hematite produced as before described, is also used in mixture with the sparry carbonates; and specimens thereof, labelled respectively with the letters D and E, exhibit the variable degree, and the manner, in which that ore is mingled with the rocks and earths, adjacent to the place of its deposit.

The specimens of bar iron marked "*Tudhoe*" are made from the produce of the brown ores. The tensile strength is about 25 tons per square inch. The bar iron and boiler plates marked "*Weardale*" made from pure spathose pig iron—are remarkable for ductility, and possess a tensile strength of about 28 tons per square inch.

The specimens of cast steel are made from Weardale spathose iron by the atmospheric process.

(Copy) "Assay Office and Laboratories,
29 Gt. St. Helens, Bishopsgate Street Within.
London, 25th Nov., 1861.

"Sample marked No. 2, Weardale '*Spiegel Eisen*' sent by Charles Attwood Esq., contains:—

Iron	...	...	...	...	99·510
Manganese	...	...	...	...	none
Carbon	...	...	...	...	0·065
Sulphur	...	...	...	...	none
Phosphorus	...	...	...	...	a trace
Silica	...	...	...	...	0·140
Loss	...	...	...	...	0·285
					100·000

(Signed) "MITCHELL & RICKARD."

(Copy) "Assay Office and Laboratories,
29 Gt. St. Helens, Bishopsgate Street Within.
London 25th Nov., 1861.

"Sample marked No. 1, '*German Spiegel Eisen*' sent by Charles Attwood Esq., contains:—

Iron	...	...	...	...	98·655
Manganese	...	...	...	...	none
Carbon	...	...	...	...	0·210
Sulphur	...	...	...	...	a trace
Phosphorus	...	...	...	...	ditto
Silica	...	...	...	...	1·062
Loss	...	...	...	...	0·073
					100·000

(Signed) "MITCHELL & RICKARD."

[395]

WELSH SLATE COMPANY, *Portmadoc, Carnarvon*.—Slates and building slates from quarries near Festiniog, Carnarvon.

[396]

WESCOMB, C., *Exeter*.—Tables of chalcedonies, jaspers, agates, petrified woods, &c., lead ores, spiral fluted nails.

[397]

WESTON & PRICE, *West Bromwich, near Birmingham*.—Bar-iron and railway fastenings.

[398]

WHARNCLIFFE SILKSTONE COLLIERY, *Sheffield*.—Coal.

[399]

WHEELER, PHILIP, & Co., *St. Austell, Cornwall*.—China clay (kaolin) and stone for porcelain and earthenware, and for bleachers and paper manufacturers; sulfate d'alumine, &c.

[400]

WHITELAW, JOHN, Manager, *Preston Grange Colliery, Prestonpans, Scotland*.—Model of miners' safety-cage, also applicable to hoists.

[401]

WHITEWAY & Co., *Kingsteignton, near Newton Abbott, Devonshire*.—Specimens of tobacco-pipe and potters' clays raised by them, with some manufactured articles from such clays.

[402]

WICKLOW COPPER MINE COMPANY (Limited), *43 Dame Street, Dublin*.—Iron pyrites, rich in sulphur.

[403]

WILLIAMS, RICHARD, & Co., *Portmadoc, Carnarvonshire*.—Slate ridges for finishing roofs, superseding lead, tiles, &c.

[404]

WILLIAMSON, CLEMENT, *Plas-yn-Morfu, Holywell, Flintshire*.—Ores of lead and zinc in the rough, and dressed.

[405]

WILLIAMSON, JOHN, *Kerridge, Macclesfield*.—Building stones, steps, landings, &c.; granite paving setts.

[406]

WILLIAMSON, ROBERT, *18 Lothian Road, Camberwell*.—Working model, to illustrate Williamson's improved system of ventilating collieries.

[407]

WILSON, GEORGE BESLY, *Forest Hall, Newcastle-on-Tyne*.—Specimen of freestone for building.

[408]

WILSON, JOHN, *Grantham*.—Carved font in Ancaster stone.

[409]

WILSON, SIR T. M., *Charlton House*.—Founders', and other sands.

[410]

WIMSHURST'S PATENT METAL FOIL COMPANY, *20 Cannon Street, E.C.*—Sheet of cut lead, one mile long.

[411]

WOLSTON, RICHARD WALTER, *Brixham, Devonshire*.—Wolston's Torbay iron paints and composition for coating materials under water.

These paints are applicable to general purposes, and resist in a remarkable degree the action of the atmosphere, and sulphureous and other gases, as well as aqueous influences.

In the year 1853, a trial was authorized by the Admiralty in Woolwich, Devonport, and Keyham dockyards. The trial in Woolwich dockyard was on a caisson, and on a large surface of iron-roofing; in Devonport yard, on the iron and wood work of a crane erected on the sea wall at the anchor wharf, and various other surfaces of wood and iron. The trials have been officially reported on, and were so satisfactory as to result in an extensive use of the paint, not only in all the dockyards, but also in the Royal Arsenal and War Departments for corrugated iron roofs and buildings, and especially for painting the wood and iron huts at Shorncliff, Colchester, and Curragh camps; as also the huts previously covered with coal tar, at Pembroke dock and on Woolwich common.

The caisson in Woolwich dockyard, painted nine years since, is in a perfectly sound condition, both under water and between wind and water.

On the important question of *expense*, the official report stated, that 62lbs. of "Wolston's Torbay Iron Paint" effectually cover as much surface as 112 lbs. of either white or red lead."

These paints have been found to stop corrosion even after it has set in to a considerable extent; and are therefore particularly valuable for the preservation of corrugated and other iron roofing; of which the following are remarkable instances:—

1. In the year 1859, two of the iron roofs over the slips Nos. 8 and 9 in Pembroke dockyard were found on inspection to be so corroded, as in the opinion of the authorities to need entire renewal; but in lieu of this, trial was made of Wolston's Torbay Iron Paint, and two coats were applied. The result has been most satisfactory, renewal now being unnecessary, and a very considerable outlay being thereby saved to the department.

2. In the year 1853, the corrugated iron roofing over the forges and mills at the Aberdare Iron Works were painted with two coats of Wolston's Torbay Iron Paint. They have had one coat since, and on examination by the engineer of the works in January, 1862, the roofs were found to be in good condition; no corrosion having

taken place, notwithstanding a constant discharge of steam and gases passing over them for a period of nine years.

3. In the spring of 1852, the iron pillars supporting the Fish-market at Brixham were painted with Wolston's Black Torbay Paint. The paint is now (January, 1862), after ten years' exposure, in a perfectly sound condition, and has effectually protected the iron from corrosion, although the building is situated close to the sea, and subject to all the damp vapours of the harbour and sea coast.

The base of these paints being iron, they are free from those properties which in lead paints are so prejudicial to health and destructive to iron. The numerous testimonials received by the manufacturer prove the paints to possess the following valuable properties:—

1. They effectually protect iron from corrosion, and stop corrosion even after it has set in.

2. The body and covering qualities are so good, that three coats are equal to four of lead paints.

3. For priming wood (and for finishing, where the colour suits), the second coat bears out nearly equal to the third of lead paint. The same effect will be found when applied to stucco or compo fronts.

4. As a *stainer* the colouring properties are so intense, that where ochre, umber, and other stainers are used, half the quantity of Torbay brown accomplishes the work with better effect and less trouble.

5. The black, for general purposes, retains its lustre longer than other black paints, and is peculiarly valuable for ship painting, as it does not fade or get rusty by the action of sea water, and owing to its covering properties is really cheaper than the ordinary black paint of much less price.

6. These paints resist intense heat, and stand well on galvanized iron, and on materials previously coated with coal tar, where all other paints fail. They also resist the effects of sulphuretted hydrogen, without loss of colour, and likewise repel the action of acids longer than other paints.

These paints are extensively used by numerous railway, harbour, and gas companies, breweries, ship-owners, iron and wood ship-building and engineering establishments.

Specimens showing the condition of the paint on iron and wood, after various periods of exposure, are exhibited.

[412]

WOMBWELL MAIN COAL COMPANY, *near Barnsley*.—Wombwell coal and section; Frodingham iron-mine, and section.

[413]

WOOD & DAGLISH, *Hetton Colliery, Durham*.—Mode of working and ventilating coal-mines, and conveyance of coals underground.

[414]

WOOD, THOMAS, & Co., *Cliff Wood and Spinkwell Quarries, Bradford*.—Ashlar Stone.

[415]

WOODHOUSE & JEFFCOCK, *Derby*.—From Shipley Collieries, Derby. Top and bottom, hard and soft coals.

[416]

WOODHOUSE & JEFFCOCK, *Derby*.—From Victoria Colliery, Warwickshire. Slate, rider, ell, and two-yard coals, and ironstones.

[417]

WOODHOUSE & JEFFCOCK, *Derby*.—From Cinderhill Colliery, Nottingham. Top and bottom hard and soft coals.

[418]

WOODHOUSE & JEFFCOCK, *Derby*.—From Granville Colliery, Derbyshire. Main and little coals.

[419]

WOODHOUSE & JEFFCOCK, *Derby*.—From Wyken Colliery, Warwickshire. Slate, ell rider, and two-yard coals.

[420]

WOODHOUSE & JEFFCOCK, *Derby*.—From Moira Colliery, Leicestershire. Main coal.

[421]

WOODHOUSE & JEFFCOCK, *Derby*.—From Oakerthorpe and Highfield Collieries, Derbyshire. Bottom, hard, and furnace coals and ironstones.

[422]

WOODHOUSE & JEFFCOCK, *Derby*.—From Baddesley Collieries, Warwickshire. Rider and two-yard coals.

[423]

WOODHOUSE & JEFFCOCK, *Derby*.—From Gresley Colliery, Derbyshire. Main and little coals.

[424]

WOODHOUSE & JEFFCOCK, *Derby*.—Swanwick Colliery, Derbyshire. Top, hard, and Dunsil coals.

[425]

WOODHOUSE & JEFFCOCK, Civil and Mining Engineers, *Derby*.—A model of the Shipley Colliery, in the county of Derby, and specimens of coals and ironstones.

[426]

WOODRUFF, T., 4 *Quadrant, Buxton*.—Derbyshire tables, vases, &c.

[427]

WOODWARD BROTHERS, *Ruabon*.—Building stone, grinding stones, and scythe stones.

[428]

WRIGHT, JAMES, & SON, *John Street Polished Granite Works, Aberdeen*.—Red Peterhead polished granite hexagon vase, &c.

[429]

YNISCEDWYN IRON COMPANY, *Swansea*.—Foundry and forge anthracite pig iron, refined metal, anthracite coal, and iron ores.

[430]

YNISCEDWYN BRICK AND PIPE COMPANY, *Swansea*.—Sewerage pipes, vases, tazzi, chimney pots, and faced bricks.

[431]

YSTALYFERA IRON COMPANY, *Swansea*.—Anthracite pig, refined metal, bars, angles, rivet boiler plate, tin, terne and Canada plates, cut nails.

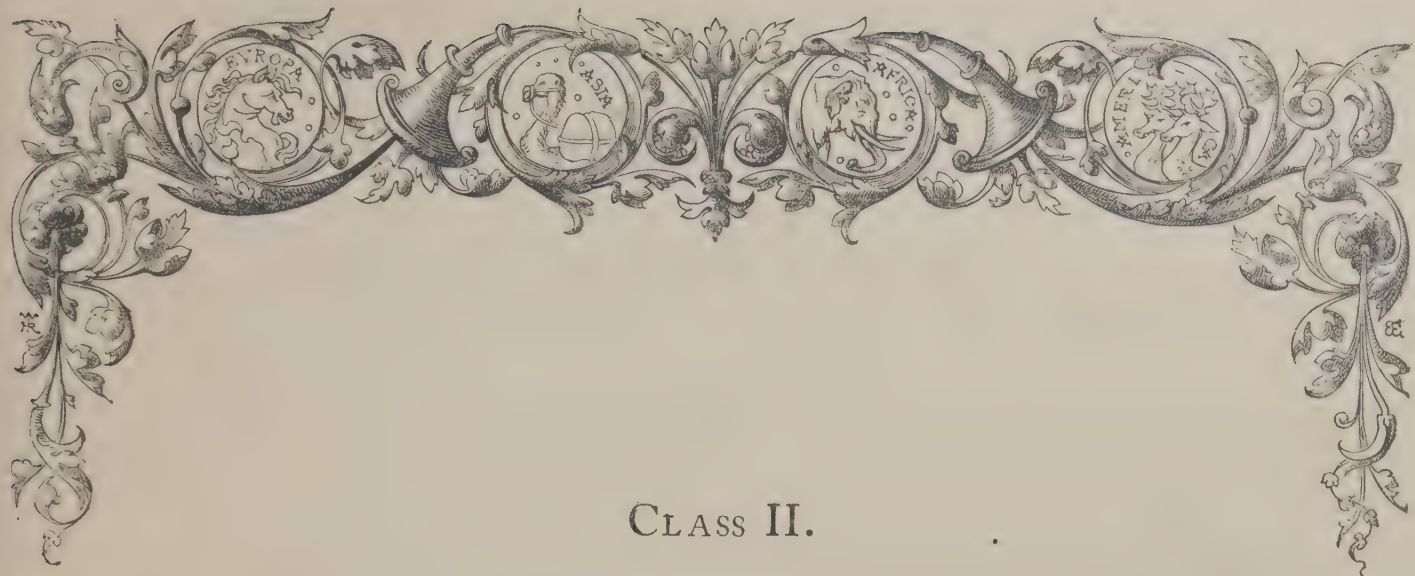
[432]

GADLY'S IRON COMPANY, *Aberdare, Glamorganshire*.—Iron, and steam coal.

[433]

LAYCOCK, J., & Co., *Seghill Colliery, Newcastle-on-Tyne*.—"Carr's Hartley" steam coal.





CLASS II.

CHEMICAL SUBSTANCES AND PRODUCTS, AND PHARMACEUTICAL PROCESSES.

SUB-CLASS A.—*Chemical Products.*

[458]

ADAMS, J., *Victoria Park, Sheffield*.—Chemicals.

[459]

ALLEN, FREDERICK, Manufacturing Chemist, *Bow Common*.—Aniline and fine chemicals.

[460]

ALBRIGHT & WILSON, *Oldbury*.—Phosphorus, amorphous phosphorus, chlorate of potash, precipitated sulphur, and Crew's chloridè of zinc.

[461]

ALLHUSEN, C., & SONS, *Newcastle-on-Tyne*.—Refined alkali, soda ash, crystal of soda, bicarbonate of soda, and bleaching powder.

[462]

ANDREW, FREDERICK WILLIAM, 3 *Neville Terrace, Queen's Elm, Brompton*.—Designs, manufactures; colla-ceramica, and petroconine, for repairing antiquities.

[463]

AVRIL, JOHN, 12 *Castle Street, Holborn*.—Insect-killing powder and patent apparatus.

[464]

BAILEY, JOHN, *Shooters Hill, Longton, Staffordshire*.—Colours for porcelain, earthenware, and glass.

The exhibitor, whose business has been established for more than forty years, manufactures all descriptions of colours used in making porcelain, earthenware, and glass.

He also supplies all kinds of potters' materials, and will forward samples, price lists, &c., to any address, upon application.

[465]

BAILEY, WILLIAM, & SON, *Horseley Fields Chemical Works, Wolverhampton*.—Chemicals.

[466]

BAKER, EDWARD, & SONS, *Birmingham*.—Nonpareil paste and liquid blacking; pure black-lead—powder and block.

[467]

BAKER, FRANCIS B., *Hampton Court*.—Crystals of sulphate of magnesia, copper, and alum.

[468]

BALKWELL & CO., *Plymouth*.—Metallic arsenic, lump arsenic, crystallized arsenic, and ground white arsenic.

[469]

BARNES, JAMES B., 1 *Trevor Terrace, Knightsbridge*.—A series of volatile organic acids and their ethers, &c.

[470]

BAPRELL, JAMES, 26 *Upper Eaton Street, Pimlico*.—Crystal plate powder, for all description of electro-plated or silver goods.

[471]

BARTLETT, BROTHERS, & Co., *Devonshire Wharf, Camden Town, N.W.*—Silicates and aluminates of soda and potash, fused and in solution; with specimens of insoluble glass (for the induration of stone, or the manufacture of artificial stone) resulting from the combination of the above alkaline solutions of silica and alumina without heat. Also specimens of artificial pumice, Bath, and Caen stone, manufactured from the waste dust or chip-pings of the said stone, combined with the above insoluble glass.

[472]

BELL & BLACK, 15 *Bow Lane, Cheapside, London*.—Patent wax vesta wire, fusees, and congreve matches.

[473]

BELL, I. L., *Newcastle-on-Tyne*.—Aluminate of soda. Oxichloride of lead.

[474]

BERGER, S., & Co., *Bromley-by-Bow*.—Rice starch.

[475]

BETTS, ALFRED, 41 *North Bar Street, Banbury*.—Boot and harness blackings; polishing paste for metals; inks.

[476]

BLAYDON CHEMICAL COMPANY, *Newcastle-upon-Tyne*.—Chemical manures, and materials used in their manufacture.

[477]

BLINKHORN, SHUTTLEWORTH, & Co., *Spalding*.—Patent composition for removing fu and other incrustations from steam boilers.

[478]

BLUNDELL, SPENCE, & Co., *Hull and London*.—Varnishes, colours, paints, oils, oil-seeds oil-cake, and chemicals.

[*Obtained the Prize Medal, London, 1851; and the First Class Medal, Paris, 1855.*]

The appended list shows the various articles manufactured by BLUNDELL, SPENCE, & Co.:—

Colours, paints, oils, and varnishes of every description.

Blundell's patent dryer, a cheap and powerful dryer for painters, floor-cloth makers, &c.

Blundell's improved marine composition for the prevention of corrosion and fouling on iron ships' bottoms—deep flesh-colour, and ready mixed for use.

Varnishes for house and coach-painters, japanners, &c.

Church varnish for interiors, quick and hard setting.

Blundell's oak stain, a new soluble brown; $\frac{1}{2}$ lb. to 1 lb. dissolved in one gallon of water makes a stain of great depth and beauty, much used in interiors.

Blundell's cooling oil, for preventing heated bearings, especially adapted for the shafts of screw steamers.

Stucco paint of all shades, chiefly intended to imitate stone.


Colza oil, superior double refined for burning.

Blundell's pale drying oil for painting in zinc white and other light colours. It dries rapidly, and can be used without spirits of turpentine.

Green composition for wooden ships, used extensively on the bottoms of fishing smacks, and is found superior to any other material. It sets in four hours.

Emerald, Schweinfurt, or Paris greens, as supplied the Continent, East Indies, China, &c.

Boiled and refined linseed oil, &c.

Blundell's linseed cakes, branded , extensively consumed throughout England and Scotland.

Resident Agent, New York, E. Hill, 180 Front Street.

Resident Agent, Melbourne, R. A. Fitch, 74 Flinders Lane East.

[479]

BOLTON & BARNITT, 146 *Holborn Bars*.—Chemical products.

[480]

BORWICK, G., *Little Moorfields*.—Baking powder.

[481]

BOUCK, JOHN T., & Co., 32 *Dickenson Street, Manchester*.—Sulphate of copper, nitrate of lead, sulphur, salts of ammonia, and tar products.

[482]

BOWDITCH, REV. W. R., *Wakefield*.—Purification of gas from sulphur. Safety-lamps : one for oil ; two for gas.

[483]

BOWER, J., *Leeds*.—Chemical products.

[484]

BRAMWELL & Co., *Newcastle-on-Tyne*.—Prussiate of potash.

[485]

BRAY & THOMPSON, *Heybrook Alum Works, Chatterley, near Tunstall, Staffordshire*.—Alum.

[486]

BRODIE, B. C., F.R.S., *Oxford*.—Graphite, chemically disintegrated and purified.

[487]

BROOMHALL, JOHN, *London*.—White and blue crystal and powder starch, from rice, wheat, potatoes, and sago.

[488]

BRYANT & MAY, *London*.—Safety-matches, which ignite only on the box ; and other chemical lights.

[489]

BUCKLEY, J. (THE TRUSTEES OF THE LATE), *Manchester*.—Sample of copperas, or sulphate of iron.

[490]

BUSH, WILLIAM JOHN, 30 *Liverpool Street, E.C.*—Essences and essential oils.

[491]

CAHN, DAVID, 12 *North Buildings, Finsbury Circus*.—Blocks for printers, especially for copper-plate and lithographic.

[492]

CALLEY, SAMUEL, *Brixham, Devon*.—Torbay iron ores and metallic paints. Manufactured iron ochres.

<p>Patent composition for ships, metal sheathing, iron ships, iron, wood, and other surfaces ; and also the celebrated Torbay iron ore, metallic paints, and mineral</p>	<p>ochres. Prices and testimonials may be had on application at the works.</p>
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[493]

CARR, T., *Birkenhead*.—Soluble super-phosphate.

[494]

CATTELL, DR., *Euston Square*.—Purified gutta percha ; varnishes ; lacquers ; metallized, stained, and enamelled surfaces ; carbons ; inks.

[495]

CHANCE, BROTHERS, & Co., *Alkali Works, near Birmingham*.—Soda, salts of ammonia, copperas, acids, and artificial manures.

[496]

CHICK, GEORGE BREILLAT, *Bristol*.—Indigo stone blue for laundry use, and patent black-lead for stoves.



G. BREILLAT CHICK's newly invented patent cylindrical black-lead. The patent consists in incorporating black-lead, by a peculiar process, with certain oils of a polishing nature ; thus giving additional brilliancy to the lead, and preventing rust upon the surface of the grate ; all other kinds of black-lead yet used are defective in this respect. A grate polished with Chick's patent lead in the spring, when fires are left off, will remain a brilliant jet, and quite free from rust, till the autumn. The patent lead is so packed as to be used without causing the slightest dust, and a servant may black-lead every grate in the house without soiling her hands.

This most useful invention is protected by her Ma-

esty's Royal Letters Patent, granted the 6th of August, 1858.

G. BREILLAT CHICK's newly discovered laundry blue, prepared from pure indigo. This beautiful blue, from its peculiar chemical combination, not only gives to all descriptions of linen, lace, muslin, and every variety of fine fabrics a clearness and whiteness equal to new, but neutralizes the effects of all acid or alkali, of an injurious character left after washing.

It is made into thumb, lion, and Queen's shapes.

Purchasers should see that the trade mark, "G. B. C.," is on each fig or cake. Without this none are genuine.

[497]

CHURCH, ARTHUR HERBERT, B.A., F.C.S., Analytical Chemist, 170 *Great Portland Street*, W.—Rare chemical products.

[498]

COLLINGS, H. A., 48 *Whiskin Street*, *London*.—Jewellers' rouge ; block lead ; steel protector urn and polishing powders.

[499]

COLMAN, J. & J., 26 *Cannon Street*, *London*, E.C.—Mustard, starch, and blue.

STARCH is made from a variety of cereals, but that which is most approved is manufactured from wheat and from rice.

WHEAT.—The process of manufacturing from wheat is as follows :—The wheat is coarsely ground, and put into a vessel, which is filled with water. After a certain number of days a natural fermentation commences ; in its progress the starch is liberated from the gluten, albumen, &c. When the fermentation has entirely ceased, the starch is obtained by sundry washings and deposits, and is perfectly pure and white ; it is then, in a liquid state, put into long narrow boxes, and, after having had the greater portion of the moisture drained from it, is broken into pieces of about six inches square, papered, and then placed in a stove or kiln, and subjected to the needful degree of heat, for thoroughly drying it. In the act of drying it forms into the crystals in which starch is usually seen. When it is required of a blue tinge a quantity of smalt is introduced.

RICE.—The first process of making starch from rice is different to that adopted with wheat. It requires to be immersed in a caustic alkaline solution, which has the same effect on rice that the fermentation has on wheat, *i. e.*, it causes the disintegration of the particles. The rice then undergoes a levigating process, and is washed and deposited in the same manner as wheat. Several patents have been taken out for the manufacture of rice starch, of which two are by the exhibitors.

FIRE-PROOF STARCH.—J. & J. Colman have for some time been directing their attention to the manufacture of

a starch to render fabrics stiffened therewith, non-inflammable. They have at length succeeded in their attempt and are now making an article, under Letters Patent which fully answers the desired end.

SATIN GLAZE STARCH.—This starch, though used in a very fluid state, is unusually strong, and more economical than the common starch ; it does not require boiling, and as the clearness, colour, and glaze which it imparts to laces and the finer fabrics of linen are permanent, it is strongly recommended.

PATENT WHITE STARCH.—This starch is manufactured on the same principle as the satin glaze starch, the only difference being that the former is blue and the latter white.

Specimens.

Wheat starch.	Bengal rice.
Patent rice starch.	Madras rice.
Patent white starch.	Gluten.
Satin glaze starch.	Rice fibre.
Patent fire-proof starch.	

INDIGO BLUE.—In preparing indigo for laundry purposes, it is moistened with water and ground as fine as possible between horizontal stones, then mixed with starch, and levigated till it acquires a sufficient consistency to be converted into "figs," commonly known as "thumb blue," or into cakes called "tittle."

Specimens.

Thumb blue.	Tittle.	Pure indigo.
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[500]

CONDY, HENRY BALLMANN, *Battersea*.—Condy's patent fluid or natural disinfectant, and other hygienic preparations.

[501]

COWAN & SONS, *Hammersmith Bridge Works, Barnes*.—Bones; animal charcoal. Patented improvements for revivifying animal charcoal.

[502]

COX & GOULD, *Chicksand Street, Whitechapel*.—Acetic acid, as manufactured from wood, and its products.

[503]

CRISP, EDWARDS, M.D., *Chelsea*.—Specimens of the bile of five hundred animals, and forty photographs from nature.

[504]

DAVIS, A., 30 *Union Street, Bishopsgate*.—Polishing paste.

[505]

DAVY, MACMURDO, & Co., 100 *Upper Thames Street; Works, Horney Lane, Bermondsey*.—Mercurial preparations; photographic and other chemicals.

[506]

DAWSON, DANIEL, *Miln's Bridge, Huddersfield*.—Benzole, nitro-benzole, aniline, and magenta powder.

[507]

DE LA RUE, W., F.R.S., & MÜLLER, H., *Bunhill Row, E.C.*—Rare chemicals.

[508]

DOUBLEDAY, HENRY, *Coggeshall, Essex*.—Dextrine, for giving a superior finish or lustre to textile fabrics.

Dextrine, for giving a superior lustre or finish to textile fabrics. It boils to a clear white solution, similar to white gum-arabic, and is to be used in the same way as starch,	}	either in lieu of, or in combination with it. It forms an excellent size for the use of paper and other manufacturers. Price 34 <i>l.</i> per ton.
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[509]

DUNELL, R. G., *Ratcliff Highway*.—Artists', decorators', paper-stainers', painters', and export colours.

[510]

DUNN, ARTHUR, *Dalston, N.E.*—Marking-ink pencils, &c.

[511]

DUNN, HEATHFIELD, & Co., *Princes Square, Finsbury, London*.—Chemical and pharmaceutical products, and photographic chemicals.

[512]

EMERY, FRANCIS, & SON, *Cobridge, Staffordshire*.—Specimens of porcelain, glass, and earthenware colours on china tablets.

[513]

ESCHWEGE, H., *Mincing Lane*.—Potable wood spirit and naphtha.

[514]

EVANS, THOMAS, 18 *Newland Street, Pimlico*.—Blacking; brush and sponge compositions for harness; saddle polish.

[515]

EVERETT & Co., 51 *Fetter Lane, London*.—Blacking, and varnish for boots.

[516]

FENN, JAMES, 4 *North Terrace, South Street, Grosvenor Square, W.*—Blackening, varnishing, waterproof dubbing, furniture oil and cream, &c.

[517]

FLEMING, A. B., & Co., *Chemical Works, Leith, Edinburgh.*—Vegetable carbon; the deepest and most intense black yet invented.

[518]

FOOT, C., & Co., *Battersea.*—Acetic, nitric, and other acids—commercial and pure, and dyes.

[519]

FOULKES & WALLWORTH, *Birkenhead.*—Cement of great tenacity for glass, wood, &c. nursery and toilet powder.

[520]

GASKELL, DEACON, & Co., *Widnes Dock, Warrington.*—Bleaching powder, alkalies, and colours.

[521]

GILES & BARRINGER, *Hackney Wick, London, N.E.*—Starch, bleached spices, harness and metal polish, and blacking.

[522]

GREATOREX, FREDERICK, 281 *King's Road, Chelsea.*—Liquid blacking.

[523]

GRIMWADE, RIDLEY, & Co., 31 *Great St. Helens, London*; 69 *St. Clements, Ipswich.*—Anti-corrosive paint for preserving all kinds of external wood, iron, plaster, stucco, and brickwork.

This improved anti-corrosive paint is superior to every other description for the preservation of out-buildings, whether of wood, plaster, or brick. It is admirably adapted for preventing the decay of old stone and brick

buildings, and is strongly recommended to noblemen, public companies, emigrants, and all connected with our colonies.

Testimonials may be obtained on application.

[524]

HAAS & Co., *Leeds.*—Dyes.

[525]

HALLETT, GEORGE, & Co., 52 *Broadwall, Blackfriars.*—Antimony, and preparations therefrom, including antimony paint.

[526]

HARE, JOHN, & Co., *Temple Gate, Bristol.*—White-lead, Brunswick greens, chrome yellows, &c. The exhibitors are manufacturers of white-lead, painters' colours of every description, varnishes of the finest quality, purified, quick, and hard drying linseed oil; also importers of olive and other oils. Established 1782.

[527]

HAWORTH & BROOKE, 33 *Lower King Street, Manchester.*—Refined indigo; sulphate of indigo; carmine of indigo; oxides of tin.

[528]

HIRST, BROOKE, & TOMLINSON, *Leeds.*—Acetic acid and acetates; naphtha; chemical and pharmaceutical preparations; varnishes, &c.

[529]

HOLLIDAY, READ, *Chemical and Lamp Works, Huddersfield*; 128 *Holborn Hill, London*.—
Tar products—benzole, aniline, &c.

The exhibitor is the patentee of the "Self-generating gas-lamp;" and a distiller and rectifier of the following coal oils and other products :—

Tar.
Naphtha.
Naphthaline.
Naphthalamine.
Para-naphthaline.
Nitro-naphthaline.
Benzole.
Nitro-benzole.
Aniline.

Aniline colours.
Creosote.
Pitch.
Paraffine.
Carbolic acid.
Picric acid.
Ammonia liquor.
Sulphate of ammonia.
Arsenic acid.

Warehouses at 128 *Holborn Hill*, and 3 *Leather Lane London*; and 28 *Rue d'Enghien, Paris*. Branch works at *Sheffield, Bradford, Oldham, and Blackburn*.

[530]

HOPKIN & WILLIAMS, 5 *New Cavendish Street, W.*—Chemical and pharmaceutical products.

[531]

HORNER, JAMES B., Merchant, *Lincoln*.—Prize manures. Silver cups awarded, 1858.

[532]

HOWARDS & SONS, *Stratford, Essex*.—Quinine; other cinchona alkaloids; cinchona barks; fine medicinal and manufacturing chemicals.

[533]

HULLE, JACOB, *Lombard Road, Battersea*.—Quinine, cinchonine, strychnine, brucine, morphine, &c., and their salts.

[534]

HUMFREY, YOOLE, & CO., *Southwark*.—Paraffine coal and its products; paraffine candles, and oils.

[535]

HURLET AND CAMPSIE ALUM COMPANY, *Glasgow*.—Alum, red and yellow prussiates.

[536]

HUSKISSON, WILLIAM, & SONS, 77 *Swinton Street, W.C.*—Chemical products.

[537]

HUTCHINSON & EARLE, *Widnes Docks, near Warrington*.—Specimens illustrating the process of alkali manufacture.

Specimens and models illustrating the manufacture of alkali :—

1. Pyrites.
2. Nitrate of soda.
3. Vitriol (sulphuric acid).
4. Common salt.
5. Salt-cake.
6. Slack (small coal).
7. Limestone.
8. Black-ash.
9. Black-ash liquor.

10. Salts.
11. Soda ash, unground.
12. Soda ash, ground.
13. Refined soda ash unground.
14. Refined soda ash, ground.
15. Soda crystals.
16. Crystals in process of conversion into bicarbonate of soda.
17. Caustic soda.
18. Bicarbonate of soda, unground.
19. Bicarbonate of soda, ground.

[538]

HYNAM, J., *Princes Square, Finsbury*.—Matches, vestas. and fusees.

[539]

JAMES, EDWARD, *Sutton Road, Plymouth*.—Starches, blues, black-leads; some useful products employed in their manufacture.

[540]

JARROW CHEMICAL COMPANY, *South Shields*.—Soda, alkali, bicarbonate of soda, Epsom salts, bleaching powder, &c.

[Honourable Mention in the Report of the Exhibition of 1851, for bicarbonate of soda and massive specimen of crystal soda.]

Manufactories at Tyne Docks, near South Shields; Friars Goose, near Gateshead; Willington Quay, near Newcastle-on-Tyne.

Specimens of Chemical Products.

Articles exhibited, with Price List for April, 1862.—These prices include casks, and delivery free on board in the Tyne, or to rail at South Shields, Newcastle, or Gateshead. The prices are also quoted in French weights and money, 25 francs being calculated as equal to 1*l.* sterling, and 1000 kilogrammes as equal to 2205 lbs. avoirdupois.

1. CRYSTAL SODA. Price 4*l.* 10*s.* per ton, or 110*fr.* 75*c.* per 1000 kilos.

2. BEST WHITE REFINED ALKALI, 40 to 52 per cent. Price 2½*d.* per cent. per cwt.: *e. g.* 40 per cent. costs 7*l.* 10*s.* per ton; equivalent to 62·78 deg. Descroisilles, at 184*fr.* 60*c.* per 1000 kilos. 52 per cent. costs 9*l.* 15*s.* per ton; equivalent to 81·62 deg. Descroisilles, at 240*fr.* per 1000 kilos. This quality is obtained by evaporating and calcining the solution from which the crystal soda is made.

3. D. P. ALKALI, 54 to 56 per cent. Price 2½*d.* per cent. per cwt.: *e. g.* 54 per cent. costs 11*l.* 5*s.* per ton; equivalent to 84·76 deg. Descroisilles, at 276*fr.* 90*c.* per 1000 kilos. This is of similar quality to the above, but of higher strength.

4. PURE ALKALI, containing 58 per cent. of soda. Price 18*l.* per ton; equivalent to 91·03 deg. Descroisilles, at 443*fr.* 5*c.* per 1000 kilos. This alkali is very nearly chemically pure.

5. CAUSTIC SODA, containing 72 to 75 per cent. soda. Price 3*d.* per cent. per cwt.: *e. g.* 72 per cent. costs 18*l.* per ton; equivalent to 113 deg. Descroisilles, at 443*fr.* 5*c.* per 1000 kilos. This is the most concentrated form in which soda is produced. By using caustic soda, soapmakers can dispense with lime in preparing their leys. It is packed in casks, or in cylinders of sheet iron.

6. SODA ASH, or Unrefined Alkali, 50 to 53 per cent. Price 2½*d.* per cent. per cwt.: *e. g.* 50 per cent. costs 8*l.* 17*s.* 1*d.* per ton; equivalent to 78·48 deg. Descroisilles, at 217*fr.* 95*c.* per 1000 kilos. This alkali contains a small quantity of insoluble matter.

7. BICARBONATE OF SODA, ground and unground. Price 12*l.* per ton, or 295*fr.* 35*c.* per 1000 kilos.

8. GLAUBER'S SALTS, or Crystallized Sulphate of Soda. Price 6*l.* per ton, or 147*fr.* 65*c.* per 1000 kilos.

9. SULPHATE OF SODA, calcined. Price 5*l.* per ton, or 123*fr.* 7*c.* per 1000 kilos.

10. REFINED SULPHATE OF SODA, calcined. Price 6*l.* per ton, or 147*fr.* 65*c.* per 1000 kilos. Prepared quite free from iron, for glassmaking.

11. BLEACHING POWDER. Price 10*l.* per ton, or 246*fr.* 14*c.* per 1000 kilos.

12. OIL OF VITRIOL, concentrated; made from sulphur. Price 7*l.* 10*s.* per ton; equivalent to 66 deg. Beaumé, at 184*fr.* 60*c.* per 1000 kilos. Carboys charged 3*s.* 6*d.* each.

13. ROUGH EPSOM SALTS, for agricultural purposes. Price 2*l.* 15*s.* per ton *in bulk*, or 67*fr.* 70*c.* per 1000 kilos.

14. REFINED EPSOM SALTS. Price 8*l.* per ton, or 196*fr.* 90*c.* per 1000 kilos.

[541]

JOHNSON & SONS, *Basinghall Street, London*.—Lunar caustic, in various shapes; photographic and other chemicals, and preparations.

[542]

JOHNSON, W. W. & R., & SONS, *Limehouse, London*.—White-lead in different stages of manufacture and colours.

[543]

JOHNSTONE, ROBERT, *Black Works, Agar Town, St. Pancras, London*.—Samples of vegetable and spirit blacks.

[544]

JONES, JOHN MILTON, *Gloucester*.—Composition for waterproofing, softening, and preserving leather; specific for foot-rot in sheep.

[545]

JONES, ORLANDO, & Co., Inventors, Patentees, and Manufacturers, *York Road, Battersea*.—Specimens of starch from rice.

[546]

JONES, W. J., Dyer to Her Majesty, 12 *Victoria Road, Belgravia*.—Chemical products, and their application in dyeing and cleaning.

[547]

JUDSON, DANIEL, & SON, 10 *Scott's Yard, Bush Lane, City*.—Dyes and dye-stuffs.

[548]

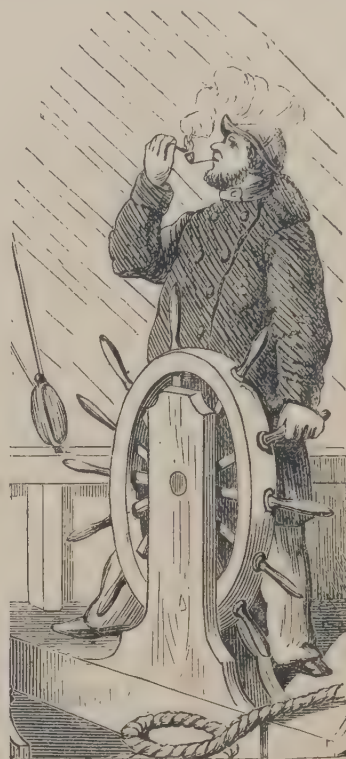
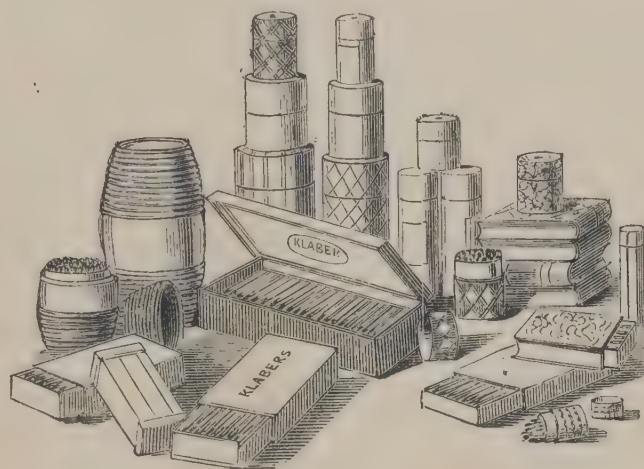
KANE, WILLIAM JOSEPH, *Chemical Works, Dublin*.—Chloride of lime, sulphate of soda, sulphuric acid, hydrochloric acid.

[549]

KINGSTON, SAMUEL, Auctioneer, Valuer, and Estate Agent, *Spalding*.—New paint, especially adapted for iron and external work.

[550]

KLABER, HERMAN, *Albion Place, London Wall, E.C.*—Wax vestas of all descriptions; flaming fusees; Vesuvians; English and foreign matches.



The exhibitor is the sole consignee of CRAY'S PATENT FLAMING FUSEE, the best cigar-light for open-air use, neither wind nor rain extinguishing the flame, and the ash not falling off to the injury of clothing.

Price-lists and samples will be forwarded to merchants and the trade on application.

The newly-invented Stearine Matches, are entirely free from unpleasant odour, and recommended to the attention of exporters.

[551]

KUKLA & Co., *Pentonville Road*.—Artificial salt.

[552]

LAMBERT, WILLIAM THOMAS, 9 *Tabernacle Row, Finsbury, London*.—Refined mercury, putty powders, chemically prepared black-lead, &c.

This black-lead, for domestic use and other polishing purposes, is a preparation of plumbago, with chemicals which facilitate its application and tend to preserve the material, to which it is applied. Its application is unattended by dust, waste, or injury to the hands. The

putty powders are made from pure metals, chosen especially for the purpose. The specimens Nos. 8 and 9 show in a remarkable manner the importance of attention to this point. The samples of mercury have been thoroughly refined and purified by W. T. Lambert's process.

[553]

LANGDALE, E. F., 72 *Hatton Garden*.—Essential oils, fruit essences, hair dye, cantharidine.

[Honourable Mention, 1851.]

Specimens of the following manufactures of E. F. Langdale are exhibited :—

Ess. ol. almonds, free from prussic acid, 28s. per lb.

Ess. gin and ess. brandy, 8s. 6d. per lb.; 1 lb. added to 50 gals. of plain spirit, makes immediately a fine London gin or cogniac brandy, without the use of a still. Wine, liqueur, and spirit flavouring of every description.

Fruit-essences.—Raspberry, strawberry, pine-apple, and every other sort, from 2s. 9d. to 12s. 6d. per lb.

English ol. mint, 32s. per lb.; English ol. lavender,

40s. per lb.; ol. jasmin, 30s. per oz.; ol. cloves, 3s. per lb., bergamot, 8s. to 14s. per lb.; lemon, 6s. to 12s. 6d. per lb.; and all others at market prices.

The Premium Hair-dye, requiring only one application, is instantaneous, harmless, and scentless in action, and may be had of any colour, at 3s. 9d. per case; cantharidine for reproducing and thickening hair, 3s. 9d. per case.

The *Lancet* report on E. F. Langdale's laboratory may be found in that journal of 10th Jan., 1857.

[554]

LANGLEY, WILLIAM, 3 *Salter's Hall Court, Cannon Street, City*.—Fine colours, and bronze powders.

Upon application, W. Langley will forward price lists and samples of the various leaf metals, gums, and colours made and imported by him.

[555]

LEATHART, CHARLES, 19A *High Street, Newington Butts*.—A perfumed oil for permanently dyeing the hair in one minute; attar brown for dyeing wool; also a green without arsenic.

MRS. C. G. LEATHART undertakes the restoration of ladies' hair to its original colour by a new process, which is completed in a few minutes. Leathart's colourific oils, for restoring hair to its original colour in a minute, do not stain the skin, and produce an effect so natural as to defy detection. They are guaranteed permanent, and are simple in application, merely requiring to be brushed

through the hair. The hair does not so much as require washing either before or after the application of the oil, so that this may truly be regarded as one of the most wonderful discoveries of its kind. The oil No. 1 gives black; No. 2, dark brown; No. 3, a medium brown; No. 4, light brown of various shades, suitable to every complexion. Prices 5s. 6d., 10s. 6d., or 21s. per case.

[556]

LETCHFORD & Co., *Whitechapel*.—Wax vestas and matches.

[557]

LEWIS, JACOB, & SON, *Pontardawe Chemical Works, Swansea*.—Acetate of soda.

[558]

LONDON MANURE COMPANY, 116 *Fenchurch Street*.—Artificial manures; raw material; manufactured products.

[559]

Longbottom, JOHN, & Co., *Belgrave Foundry, Leeds*.—Animal and vegetable substances carbonized by Longbottom's patent process.

[560]

LUCAS, GEORGE, 44 *Kennedy Street, Manchester*.—Machine-engraved, patent mineral-filled brass and zinc sign-plates.

[561]

MACKAY & Co., *Inverness*.—Permanent manure; chemical manufacture supplying all the elements extracted from soil by roots and cereals.

[562]

MANDER BROTHERS, *Wolverhampton, and 363 Oxford Street*.—Varnish and japan manufacturers: cabinet of varnishes and gums.

[Obtained the Medal of Honour at the Paris Exhibition of 1855.]

MANDER BROTHERS have recently introduced several important improvements into the manufacture of varnishes, by which they can secure their greater brilliancy, durability, and unvarying excellence.

By the careful observation of 60 years, and by giving their exclusive attention to the production of varnishes, they have thus succeeded in bringing them to a high state of perfection.

They can refer with satisfaction to the numerous contributions to this exhibition, which have been finished with their manufactures, particularly to the beautiful decorative

and other works of the following well-known firms, to which special reference has been kindly permitted, viz:—

Carriage builders.—Messrs. R. & F. Offord, Wells Street, Oxford Street, London; Messrs. McNaught & Smith, Worcester.

Decorator.—Mr. T. Kershaw, 38 Baker Street, Portman Square, London.

Slate enameller.—Mr. G. E. Magnus, Pimlico slate works, London.

Japanners.—Messrs. John Bettridge & Co., Royal Papier Mâché Works, Birmingham.

[563]

MARSHALL, JOHN, SON, & Co., *London and Leeds*.—Cudbear, orchill, indigo, carmine, lac dye, dye-woods, &c.

[564]

MASON, C. F. ALPHA, 13 *Walcot Place, Kennington Road, S.*—Blacking, exhibited on calf leather; other preparations for boots.

[565]

MAY & BAKER, *Garden and Phoenix Wharves, Battersea*.—Mercurial and other chemical products.

[566]

MELINCRYTHAN CHEMICAL COMPANY, *Neath*.—Acetates and other products derived from the dry distillation of wood.

[567]

METROPOLITAN ALUM COMPANY, *Bow Common*.—Alum.

[568]

MILLER, GEORGE, & Co., *Glasgow*.—Products of Boghead mineral, and suitable lamps; products of coal tar.

[569]

MOCKFORD & Co., 7 *Mincing Lane*.—Copperases, acids, caustic soda, Glauber salts, ochres, Venetian reds, chemicals, and colours.

[570]

MORSON, THOMAS, & SON, *Southampton Row and Hornsey Road*.—Chemical and pharmaceutical products.

[571]

MUSPRATT, BROTHERS, & HUNTLEY, *Liverpool, and Flint, North Wales*.—Products of the soda manufacture; chloride of lime; chlorate of potash; sulphate of alumina.

[572]

NAYLOR, WILLIAM, 4A *James Street, Oxford Street*.—Samples of varnish; a tried pattern of each varnish.

[573]

NEWMAN, J., *Soho Square*.—Pigments.

[574]

ODLING, ANSELM, 30 *Glasshouse Street, Vauxhall*.—Patent ammonia made by sulphuric acid, charcoal, and coal gas.

[575]

PALING, *Newark, Nottinghamshire*.—Starch; printers' flour; cattle food manures; and turnip fly preventative.

[576]

PARSONS, FLETCHER, & Co., *Bread Street*.—Italian wheaten starch and gluten; Indian rice starch.

[577]

PATENT NITRO-PHOSPHATE COMPANY, 109 *Fenchurch Street, E.C.*—Manures,—and materials used in their manufacture.

[578]

PATENT PLUMBAGO CRUCIBLE COMPANY, *Battersea Works, S.W.*—Samples of plumbago, black-lead, graphite, &c., in the natural and manufactured state.

[579]

PEACOCK & BUCHAN, *Southampton*.—Compositions for ships' bottoms; specimens of iron, wood, and copper; specimens of barnacles, &c., taken from ships coated with copper, zinc, and red-lead. (*See page 48.*)

[580]

PEGG, HARPER, & Co., *Derby*.—Painters' colours; plaster of Paris; barytes; mineral white, and emery.

[581]

PERKIN & SONS, *Greenford Green, Middlesex*.—Specimens illustrating the manufacture and application of W. H. Perkin's patent aniline purple.

[582]

PINCOFFS & Co., *Manchester*.—Patent commercial alizarine and garancine.

[583]

POTTER, W. H., 23 *Clapham Road Place, Surrey*.—Manures.

[584]

REA, JAMES, 115 *Wardour Street*.—Shellacs, resins, and varnishes.

PEACOCK & BUCHAN, *Southampton*.—Compositions for ships' bottoms; specimens of iron, wood, and copper; specimens of barnacles, &c., taken from ships coated with copper, zinc, and red lead.

PEACOCK & BUCHAN'S Improved Compositions for Ships' Bottoms, &c., are the best preservatives known against corrosion and fouling on iron and other ships. They give additional speed, and shortly after immersion become slimy like the back of a fish.

The "Atrato," "Himalaya," "Simla," "Shannon," "Nubia," "Delta," "Ceylon," "Pera," and other fast steamers, have always used the No. 2 Composition from the commencement of their career, and still continue to use it with unimpaired speed.

The Spanish Government, after trying experiments with every known composition for two years, have decided on using these compositions for the Spanish navy, and have recently ordered ten tons to be sent to their naval dock-yards.

The following gratifying communications have been lately received:—

"Swansea, July 10th, 1861.

"Messrs. Peacock & Buchan,

"Gentlemen,—Our two iron ships, 'Deerslayer' and 'La Serena,' have just returned from the West Coast of South America, the former having been absent from England eight months, and the latter eleven months on the voyage. Your composition has answered well, and effectually kept them from fouling. We shall continue to use it, believing it to be superior to any other coating we have tried.

"We are, Gentlemen, your obedient servants,

"PRO HENRY BATH & SON,

"CHAS. BATH.

"P.S. When the 'Deerslayer' arrived home last voyage from Chili, after an absence of seven and a half months, and was put in dock, we found her so clean that we believe she might have made a second Chili voyage without docking."

"HER MAJESTY'S SHIP 'DEFENCE.'—The great success that has attended Messrs. Peacock & Buchan's compositions for ships' bottoms is manifesting itself more and more every day, and the Lords Commissioners of the Admiralty, after proving its merits on the bottom of the iron troop-ship 'Himalaya,' for a series of years, in voyages to the West Indies, Cape of Good Hope, and Mediterranean, also on various other iron steamers in the navy, in competition with other compositions, have decided to apply it to Her Majesty's ship 'Defence,' and she is now being coated with it. We understand that one of the chief merits of this preparation is its entire freedom from any admixture of *copper*, so that no galvanic action can take place to the injury of the iron plates and rivets—a very essential point in the preservation of the future navy of England, as it is beginning to be generally acknowledged that ere many years pass away, our wooden walls must give place to 'iron sides,' and this paint will occupy the place of copper sheathing, as at present used in the navy, at a much reduced cost, whilst the saving in repairs to our iron fleet, will, in future years, reduce

our Navy Estimates considerably, although no doubt it will cost an immense sum to organize an iron fleet in the outset."—*Hampshire Independent*, October 26, 1861.

Several compositions for ships' bottoms having been patented within the last few years containing copper (the patentees being doubtless in ignorance of the injurious effects of copper on iron), Messrs. Peacock & Buchan conceive it to be their duty to inform the public of the results of their experiments with preparations of copper commenced upwards of twenty-four years ago, and laid aside in 1847,* and herewith annex a letter from the Superintendent of the Peninsular and Oriental Company on this interesting subject, after examining the professional opinions of some of the first practical chemists of the day.

From J. R. Engledue, Esq., to Messrs. Peacock & Buchan.

"Peninsular and Oriental Company's Office,
Southampton, Oct. 12.

"Messrs. Peacock & Buchan,

"Dear Sirs,—I am much obliged for your (Mr. Peacock's) letter on the subject of galvanic action on the bottoms of iron ships, accompanied by the professional opinions of Dr. Noad, Dr. Normandy, and Dr. Medlock, against the use of copper preparations for coating. My own experience is quite in accordance with these gentlemen's views as well as your own: I remember that fearful results took place on the bottoms of the late steamers 'Pasha' and 'Madrid,' belonging to this company, by the use of Baron W——'s Copper Composition † after only six months' trial, and I have never allowed it to be again used on any of the company's ships, whereas our iron ships that have been using red lead and your composition since the year 1848, are as sound and good as the first day.

"I have lately had the 'Euxine' scraped bright for examination. Her bottom is perfect, not a plate defective; whereas I learn that three iron ships of about the same size and age as the 'Euxine,' which I am told have been using a preparation of copper on their bottoms, have lately either been condemned or require new bottoms; we have not shifted a plate, and scarcely a rivet, in any of the company's ships, except the 'Haddington,' which vessel also had Baron W——'s copper preparation on her for some time.

"I continue to hear very satisfactory results of the use of your composition on our iron fleet in India and Australia, which you will be pleased to know.

"I remain, Dear Sirs, your obedient servant,

(Signed) "J. R. ENGLEDUÉ,

"Superintendent of the Peninsular and
Oriental Company."

* See Pamphlet. † Oxide of copper with naphtha.

For information, &c., application should be made to the manufacturers direct, Southampton; to Alfred Brett & Co., 150 Leadenhall Street, London; to Mr. Peter Cato, Drury Buildings, Water Street, Liverpool; or to Messrs. McSymon & Potter, Sailmakers, Glasgow.

[585]

RECKITT, J., & SONS, *Hull*.—Starches, blues, and black-leads.

[586]

REEVES & SONS, 113 *Cheapside*.—Fine pigments.

[587]

RICHARDSON, BROTHERS, & Co., 17 *St. Helen's Place, London*.—Refined saltpetre.

[588]

ROBERTS, DALE, & Co., *Manchester*.—Oxalic acid ; caustic soda ; chemical products ; pigments ; aniline colours ; toilet soaps.

[589]

ROOTH, JOHN SAMPSON, *Chesterfield*.—Naphtha ; acetic acid ; acetates of lime and lead ; iron liquor ; charcoal, &c.

[590]

ROSE, WILLIAM A., 66 *Upper Thames Street, London*.—Colours, varnishes, &c.

<p>White-lead, dry and ground in oil, red-lead, litharge, white zinc, powdered and ground ; various colours for house-painters', ship-builders', and railway companies' use, anti-oxide for iron bridges, &c.</p>	<p>painting purposes, lubricating and burning ; greases for railway carriages, waggons, hot necks, wire ropes, &c. ; cotton waste for cleaning machinery ; tar, pitch, and rosin.</p>
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Varnishes for coachmakers' and builders' use ; oils for

[591]

ROWNEY, GEORGE, & Co., 51 *Rathbone Place*.—Fine pigments.

[592]

RUMNEY, ROBERT, *Ardwick Chemical Works, Manchester*.—Illustrations of new chemicals used in dyeing and calico printing ; introduced since the Great Exhibition of 1851.

[593]

RUMNEY, ROBERT, *Ardwick Chemical Works, Manchester*.—Silicates of soda and potash ; uric acid and compounds.

[594]

RUMSEY, WILLIAM S., 3 *Clapham Rise, Surrey, S.*—Chemical productions for polishing all kinds of metals.

[595]

SAVORY & MOORE, 143 *New Bond Street*.—Chemicals.

[596]

SCOTT, WENTWORTH L., *Westbourne Park, London*.—Fabrics dyed with patent dianthine and aniline green ; various mordants.

[597]

SHAND, GEORGE, Chemist, *Stirling*.—Specimens of tar, and chemical products derived from animal, mineral, and vegetable substances.

[598]

SHANKS, JAMES, *St. Helen's, Lancashire*.—A cycle of processes for the manufacture of chlorine.

[599]

SIDEBOTTOM, ALFRED, *Camberwell*.—Painting executed with an aqueous chemical vehicle that will resist water and atmospheric influences ; chemical letter-copying fluid ; hæmatoxylin, lakes, &c.

[600]

SIMPSON, MAULE, & NICHOLSON, 1 & 2 *Kennington Road*.—Chemical products from coal tar ; benzole, nitro-benzole, aniline, mauve, magenta, &c.

[601]
SMITH, BENJAMIN, & SONS, *Spitalfields*.—Archil, cudbear, and patent orchelline; lichens from whence produced; dyed specimens.

[602]
SMITH, T. L., & Co., *St. James' Road, Holloway*.—Starch.

[603]
SMITH, T. W., *Lower Street, Islington*.—Magenta, lake, and other pigments.

[604]
SMITH, T. & H., *London and Edinburgh*.—Products from opium, aloin, caffeine, &c.

[605]
SPENCE, PETER, *Pendleton Alum Works, Manchester, and Goole Alum Works, Goole*.—Alum, and raw and calcined shale.

[606]
SPRINGFIELD STARCH COMPANY, 104 *Upper Thames Street, London, E.C.*—Starch and British gums.

[607]
STANFORD, EDWARD CHARLES CORTIS, *Worthing, Sussex*.—New products obtained by the destructive distillation of seaweeds.

[608]
STENHOUSE, J., F.R.S., &c., *Rodney Street, Islington*.—Rare chemicals.

[609]
STIFF & FRY, *Redcliff Street, Bristol*.—Starch, and other products from rice and wheat.

[610]
STRUVE & Co., *Royal German Spa, Brighton*.—Artificial mineral waters.

<p>STRUVE and Co. prepare the waters of Selters, Tachingen, Vichy, Geilnau, Carlsbad, Ems, Adelheidsquelle, Obersalzbrunnen, Pullna, Seidschütz, Friedrichshall, Marienbad, Eger, Kissingen, Spa, and Pyrmont.</p>	<p>These waters are identical in their composition with those of the natural springs, and the chalybeates contain the full amount of carbonate of iron, in which respect they are superior to the imported ones.</p>
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[611]
SYMONS, THOMAS, Manufacturing Chemist, *Derby*.—Oil of vitriol; sulphate of ammonia; colcothar.

[612]
TUDOR, SAMUEL & WILLIAM, *London, and Lead Works, Hull*.—Carbonate of lead; white-lead of commerce.

[613]
VERSMANN, FREDERICK, 7 *Bury Court, St. Mary Axe, London*.—Wolfram ores; colours; tungstate of soda; ladies' antilammable life-preserver. (See page 51.)

[614]
VINCENT, CHARLES W., 2 *Greyhound Court, Milford Lane, W.C.*—Varnishes for making black and coloured printing-inks.

[615]
WALKER ALKALI COMPANY, *Newcastle*.—Hyposulphite of soda; patent resin size; soda crystals; sulphate of zinc; alkali.

[616]
WALLIS, GEORGE & THOMAS, 64 *Long Acre, London, W.C.*—Resins; oils; extracts; varnishes, &c.

[617]
WARD, F. O., *Hertford Street, Mayfair*.—Series illustrating new process for extracting alkali from natural alkaliferous silicates.

VERSMANN, FREDERICK, 7 *Bury Court, St. Mary Axe, London.*—Wolfram ores; colours; tungstate of soda; ladies' antflammable life-preserver.



THE LADIES' LIFE PRESERVER FROM FIRE.—Ladies' dresses and other textiles steeped in a solution of this compound are rendered non-inflammable, without injury to texture, colour, or appearance.

Manufacturers and Licencees.—Briggs & Co., Great Peter Street, Westminster.

Wholesale Agents.—Johnson & Sons, 18A Basinghall Street, City.

[618]

WARD, F. O., *Hertford Street, Mayfair.*—Series illustrating new process for separating the animal and vegetable ingredients of mixed rags.

[619]

WARD, JOHN, & Co., 452 *Garscube Road, Glasgow.*—Kelp, and its products.

[620]

WHAITE, H., 24 *Bridge Street, Manchester.*—Composition for painting flags.

[621]

WHITE, JOHN & JAMES, *Shawfield Works, Glasgow.*—Bichromate of potash.

[622]

WHITWORTH, GEORGE, & Co., *Jamaica Row, Bermondsey.*—Concentrated fish manure for wheat, oats, barley, &c. (*See page 52.*)

[623]

WILKINSON, HEYWOODS, & CLARK, *Battle Bridge, London, N.*—Varnishes; japan; colours, dry and ground; oxidized oils, &c.

Varnishes, japan, and gold size, for coach-makers' use.

Copals and oak varnishes for the use of decorators and painters, especially lucca oil-varnish, for white work and delicate woods.

Oxidized oil—showing its application to linen and paper.

Complete samples of gum resins, copals, animis, damas, &c., &c.

General assortment of colours adapted for coach painters, artists, decorators, house, ship, and sign painters, paper stainers, and colourers. Attention is especially directed to the greens of Messrs. W. H. & Co., on their wall board, warranted thoroughly permanent in oil.

WHITWORTH, GEORGE, & Co., *Jamaica Row, Bermondsey*.—Concentrated fish manure for wheat, oats, barley, &c.

MESSRS. WHITWORTH & Co. recommend their fish manure with every confidence to the attention of farmers and agriculturists, as being the fertilizer calculated to produce a healthy, sound, and heavy crop.

Concentrated fish manure, for wheat, oats, barley, turnips, &c. ... £ s. d. 6 0 0 per ton.

This manure contains all the properties of Peruvian guano, and it is considerably richer in soluble phosphate, the want of which often causes guano to fail. These properties make it fit to be classed as one of the best general manures known. The quantity required is four to five cwt. per acre, either drilled or sown broad-cast.

Fish—Superphosphate of lime ... 6 0 0 „
Fur waste ... 5 0 0 „
Grass manure ... 3 3 0 „
Nitro salt (containing particles of nitrate of soda) ... 2 2 0 „

The manures are sent in bags at the above prices free to any railway station or wharf in London. A single trial will prove the efficiency and economy of the manures.

Analysis of Whitworth's Fish Manure, made by Messrs. Way & Evans.

“15 Welbeck Street, W., July 27, 1861.

“DEAR SIRs,—We beg to hand you the analysis of the fish manure made by you. It contains a fair quantity of phosphates, and more than the usual amount of nitrogenous matter.

“We are, dear Sirs, yours truly,

“WAY & EVANS.”

(Copy—ANALYSIS.)

Moisture	...	...	...	13·01
Organic matter, combined water and salts of ammonia	...	...	...	44·30
Sand	...	...	...	6·42
Biphosphate of lime	...	...	...	9·10
Neutral soluble phosphate	...	...	...	14·20
Insoluble phosphate of lime	...	...	...	8·71
Anhydrous sulphate of lime	...	...	...	22·43
Alkaline salts, &c.	...	...	...	1·08
				100·00

Nitrogen ... 6·89

Ammonia ... 7·76

Second Part.

Analysis of Whitworth's Fish Superphosphate of Lime made by Dr. Letheby.

“41, Finsbury Square, January 18th, 1852.

“DEAR SIR,—I have to report that the sample of fish superphosphate manure which you left with me for analysis has the following composition:—

Moisture	...	...	...	22·06
Organic matter	...	...	...	11·85
Free sulph. acid	...	...	...	13·73
Soluble phosphate of lime	...	...	...	23·14
Insoluble phosphate	...	...	...	4·04
Sulphate of lime	...	...	...	23·14
Sand and oxide of iron	...	...	...	2·04
				100·00

Ammonia ... 3·70

“According to the usual mode of computing the value of this manure it would be worth 11*l.* 10*s.* per ton.

“I remain yours truly,

“Mr. Whitworth.”

“HENRY LETHEBY.

[624]

WILSHERE & RABBETH, *Great Western Road, Paddington; 2 Alexander Terrace, Ledbury Road, Bayswater*.—Samples of varnishes and colours.

Extra pale body-varnish for coach-makers 26/ per gallon.
Ditto, ditto, for decorators 22/ 24/ 26/ „
Pale carriage varnish ... 14/ 16/ 18/ „
Pale copal ditto ... 16/ 18/ „
Pale oak ditto ... 10/ 12/ „

Pale furniture varnish ... 18/ per gallon.
Scarlet lake ... 20/ 24/ per lb.
Crimson ditto ... 20/ 24/ „
Purple ditto ... 20/ „
Pure chromes ... 1/6 „

[625]

WILSON & FLETCHER, *Jubilee Street, Mile End, London, E.*—Aniline and aniline colours; emerald green and other pigments.

[626]

WILSON, JOHN, & SONS, *Hurlet, near Glasgow*.—Alum; alum-cake; gelatine and pearl hardening, made from bones.

WOTHERSPOON, WILLIAM, *Glenfield Starch Works, Paisley.*—Glenfield patent starch, manufactured entirely from sago flour, and used in the Royal laundry. (See page 54.)



PARTIAL VIEW OF THE BLEACHING DEPARTMENT

OF THE

GLENFIELD STARCH WORKS, PAISLEY.

[627]

WINSOR & NEWTON, 38 *Rathbone Place, W., and North London Colour Works, Kentish Town, N.W.*—Fine colours.

[628]

WOOD, E., *Port-hill, Stoke-on-Trent.*—Borax, boracic acid, and china glaze.

[629]

WOOD & BEDFORD, *Leeds.*—Orchil and cudbear.

[630]

WOTHERSPOON, WILLIAM, *Glenfield Starch Works, Paisley.*—Glenfield patent starch, manufactured entirely from sago flour, and used in the Royal laundry. (*See page 53.*)

Although it is little more than twenty years since these extensive works were established, they are now by far the largest of the kind in the country, covering nearly two acres of ground, and giving employment to upwards of 250 persons.

The works are situated to the extreme south-west of the important manufacturing town of Paisley, and near to the foot of "Gleniffer Braes," rendered famous by the poet Tannahill.

These works are a series of brick, iron, and glass buildings, admirably planned, and having every appliance which science can afford for lightening the labour and improving the health of the workpeople.

A complete network of railways intersects the various departments, on which trucks are constantly employed transporting the materials used in the manufacture of the Glenfield Starch from one department to another, and the perfect system of supervision and division of labour are much to be admired, making the various operations fit into each other like tenons into mortices.

The raw material from which the well-known Glenfield Starch is made is East India sago, which is imported by the manufacturers themselves. It may be remarked here, that other starches are made principally from wheat, and on that account the "Glenfield Starch," independent of its superior qualities, has a claim upon public favour, as not interfering with the staple food of the people.

There are two stoves for drying the starch, one of which is the largest in Scotland, or perhaps in the world.

After the starch is dried it is again returned by rail to the bottom of the hoist, whence it is raised to the upper floors to be packed in the small parcels, which, in their blue and green wrappers, are so well known throughout the country, and of which upwards of thirty millions are sold annually. The packing department alone is divided into four branches, the workers in which are females; each department is spacious, clean, and perfectly ventilated.

The warehouse and its arrangements form a model of perfection. This part of the works, which is of recent erection runs through the centre of the premises; it is fireproof, and forms a bulwark between the two principal buildings, to prevent the spread of fire. At the end of this building, and opposite the gateway, are the loading platform and machinery, at which half a dozen lorries can be entirely loaded within an hour.

From the high position which the Glenfield Starch has acquired, it is not to be wondered at that the proprietors have often had to raise actions in the Court of Chancery in England, and the Court of Session in Scotland, to suppress spurious imitations of their manufacture; but it is to be hoped that a Bill on Trade Marks, which would greatly mitigate this crying commercial evil, will soon become the law of the land.

Purchasers may obtain the genuine Glenfield Starch, by observing the trade mark, as well as the name of W. Wotherspoon, the manufacturer, which is on each packet.

[631]

WRIGHT, FRANCIS, & Co., 11 *Old Fish Street, Doctors' Commons, E.C.*—Pharmaceutical preparations and chemicals.

[632]

YOUNG, JAMES, *Bathgate.*—Specimens of paraffine made from different kinds of coal.

[634]

YOUNG, J. W., *Neath, Glamorganshire.*—Paint and paint pigments.



SUB-CLASS B.—*Medical and Pharmaceutical Processes.*

[644]

ALLEN & HANBURY, *Plough Court, Lombard Street, London.*—Drugs and pharmaceutical preparations.

[645]

BASS, JAMES, *81 Hatton Garden, London.*—Pharmaceutical products.

Intended to facilitate the exhibition of the following medicines :—

WHITE POPPY.—A preparation from the dried capsules, to be mixed with simple syrup, for making pure syrup of white poppy extemporaneously.

SENNA.—Aromatic syrup. An agreeable and efficacious form for administering senna, especially to children.

RHUBARB.—Aromatic syrup. An improved substitute for the syrup of rhubarb commonly used.

BALSAM OF TOLU.—Concentrated syrup.

GINGER.—Concentrated syrup.

ORANGE PEEL.—Concentrated syrup. These concentrated syrups, diluted to the prescribed extent with

simple syrup, will form syrups of the articles specified of full strength and great purity.

TARAXACUM.—A clear liquid preparation of this medicine, obtained from the fresh root by a direct process, and without artificial heat.

CUBEBS.—A concentrated solution of the resinous extract, and essential oil of cubebs.

ERGOT OF RYE.—A solution of the active principles of this substance, four fluid drams equal in strength to one dram of ergot.

PERUVIAN BARK.—Fluid preparations from the pale yellow and red varieties of cinchona, being convenient substitutes for the ordinary decoction and infusion of bark.

[646]

BASTICK, WILLIAM, *Brook Street, London.*—Medicaments prepared by improved processes, which insure their uniform therapeutic activity.

[647]

BROWN, THOMAS BELLISSON, *103 Icknield Street, Birmingham.*—Cantharidine blistering tissue ; tissue dressing ; transparent plaster ; cantharidine horse blister.

[648]

BULLOCK & REYNOLDS, *3 Hanover Street, Hanover Square, London.*—Chemical and pharmaceutical products.

[649]

CURTIS & Co., Manufacturing Chemists, *48 Baker Street, London, W.*—Pharmaceutical preparations, and new inhaler.

[650]

DARBY & GOSDEN, *140 Leadenhall Street, London.*—Pharmaceutical products.

[651]

DENOVAL, JULES, *1 Walpole Street, New Cross, S.E.*—Nauseous and alterable drugs enclosed in soluble gelatine. (*See page 56.*)

[652]

DICKINSON, WILLIAM, Chemist, *Cambridge Street, and Queen's Gardens, London.*—An improved series of medicinal preparations.

[653]

DUNCAN, FLOCKHART, & Co., *Edinburgh.*—Chloroform prepared from pure alcohol ; chloroform prepared from methylated alcohol ; chloric ether.

[654]

GARDNER, J., M.D., *23 Montague Street.*—Pharmaceutical chemicals.

[655]

HOLLAND, WILLIAM, *Market Deeping.*—Essential oils ; vegetable extracts ; dried plants and roots.

[656]

HOOPER, WILLIAM, *7 Pall Mall East, S.W.*—Chemical and pharmaceutical preparations.

DENOVAL, JULES, 1 *Walpole Street, New Cross, S.E.*—Nauseous and alterable drugs enclosed in soluble gelatine.

DENOVAL'S SUPERIOR CAPSULES. — These beautifully finished capsules are made with the most genuine drugs; they are inclosed in a perfectly soluble envelope composed of gelatine, gum, and sugar, and their great superiority has brought them in great demand with the druggists and the public. Such a capsule, combining the greatest qualities with cheapness, has long been a desideratum.

Their shape facilitates their ingress, and the gentle solubility of the envelope allows the dissolution to take place in the stomach without the unpleasant effects produced by common capsules. Capsules should dissolve in the stomach; for if they do not, the drugs they contain cannot be absorbed by the system, and will, consequently, produce no effect. They are put up in boxes of 36 each, with directions for use, and each box is guaranteed by the seal and signature of "DENOVAL."

A superior extra large capaiba capsule, containing 20 minims (three forming a dose), the finest sold in Paris per box 2s. 6d.

Best, ordinary size, green label, four forming a dose per box 1s. 6d.

A very superior capsule, of cubeb-oil and copai-
baiba per box 2s. 6d.

Copaiba, pepsine, and bismuth ... 3s. 0d.

Cod-liver oil, castor oil, turpentine, Norwegian tar, ether, chloroform, and all kinds of capsules.

The attention of the medical faculty, and of all those who have to prescribe, is particularly called to Denoval's Compound Capsules of Iodidum Ferri, containing one grain of iodide of iron and four of cod-liver oil.

Also Denoval's Oleidum Pearls, highly recommended by eminent medical men for diseases of the chest, phthisis, severe coughs, chlorosis, debility, and many other diseases.

Price 2s. 6d. per box of 36. Directions for use in each box.

[657]

LAMACRAFT & Co., 6 *Upper Rathbone Place.*—Court plaster, medical plasters, &c.

[658]

LAURENCE, W. H., 163 *Sloane Street, S.W.*—Cod-liver oil.

[659]

L'E MAOUT, *Princes Street, Soho.*—Gelatine capsules enclosing nauseous drugs.

[660]

MACFARLAN, J. F., & Co., *North Bridge, Edinburgh.*—Chemical preparations from opium, green-heart bark, galls, and methylated spirit.

[Obtained the Prize Medal in 1851.]

Chemical preparations from opium, green-heart bark, galls, and methylated spirit; morphia and its salts; codeine and salts; beberine and its sulphate; tannin, gallic acid, and ink; chloroform, ether, and hyponitrous ether.

[661]

MAJOR, JOSEPH, V.S., 5 *Park Lane, Piccadilly, W.*—Medicine chests, and horse and cattle medicines.

[662]

MOFFAT, GEORGE DICKSON, *Dundas Street, Edinburgh.*—Pure medicinal cod-liver oil.

[663]

MURRAY, SIR JAMES, M.D., *Anatomy Office, Temple Street, Dublin.*—Specimens of fluid magnesia, camphor, and aerated extract of bark.

Sir James Murray exhibits his aerated magnesia and camphor, and specimens of bitters, barks, and resins digested in these fluids; with printed descriptions.

[664]

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN, COMMITTEE OF THE, 17 *Bloomsbury Square.*—Systematic collection of drugs and preparations used in medicine.

[665]

RANSOM, WILLIAM, Manufacturing Chemist and Distiller of essential oils, *Hitchin*.—Medicinal extracts and English essential oils.

[666]

SQUIRE, PETER, 277 *Oxford Street, London*.—Chemical and pharmaceutical products.

[667]

TUSTIAN, JOHN, *Milcombe, near Banbury, Oxon*.—*Rosæ gallica* ; *conf. rosæ* ; *conf. rosæ canin ext. hyoscyami*.

[668]

USHER, R., *Bodicot, near Banbury*.—Rhubarb and other medicinal herbs.

[669]

WATERS, ROBERT, 2 *Martin's Lane, Cannon Street, London*.—Quinine wine: the finest tonic known to science.

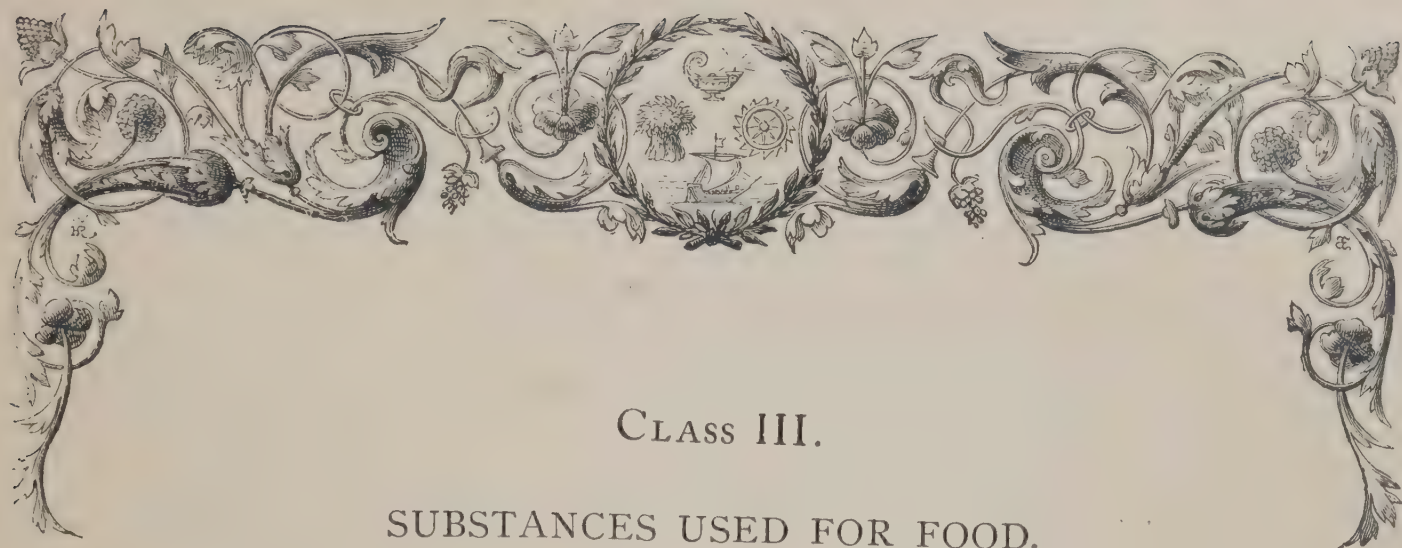
QUININE WINE.—A preparation in which the sulphate of quinine is held in solution, without the aid of sulphuric or mineral acids. The intense bitterness of the sulphate is neutralized, whilst its medicinal properties are enhanced by the peculiar process used. Dr. Hassall says,

“it is a useful and excellent preparation.” Dr. Andrews, E. Cousens, Esq., M.R.C.S., and the medical profession generally, as well as the press, speak of it in the highest terms of approbation.

[670]

WATTS, JOHN, & Co., 107 *Edgeware Road, London*.—Pharmaceutical preparations; extracts, fluid and solid, &c.





CLASS III.

SUBSTANCES USED FOR FOOD.

SUB-CLASS A.—*Agricultural Produce.*

[700]

ADKINS, THOMAS K., *Wallingford*.—English flour manufactured by Callard's patent process.

[701]

ASPREY, JAMES, *Sandleford, Newbury, Berks*.—White trump wheats; chevalier barley; black Tartar oats.

[702]

BAKERS, WHITE, & MORGAN, *Hibernian Chambers, London*.—British and foreign hops.

[703]

BARRY, DYKES, & CO., *Type Street, Finsbury, and Grand Surrey Docks, London*.—Chicory, cocoa, and mustard.

[704]

BROWN & POLSON, *Paisley, and 23 Ironmonger Lane, London*.—Patent corn flour and patent starch.

[705]

BUTLER & McCULLOCH, *Covent Garden Market, London*.—Dried medical plants, flowers, roots, and seeds.

[706]

CAHILL, MICHAEL, Land Agent, *Ballyconra, Kilkenny*.—Wheat, oats, and wool.

[707]

CARTER, JAMES, & CO., *238 High Holborn*.—Samples of seeds, flowers and floral designs.

[708]

CHAMBERS, W. E., *Corn Market, Mark Lane*.—Cereals.

[709]

CHITTY, EDWARD, *Guildford*.—Wheaten flour (best whites).

[710]

CHRISTIE, WILLIAM, *Steam Flour Mills, Chelsea*.—Wheat manufactured into flour, showing its produce.

[711]

DAVIS, EDWARD JOHN, *Globe Wharf, Mile End Road, London*.—Compressed hay and other forage.

This is a new mode of packing hay and other forage for transport, without using iron hoops or other bands. Its advantages are, a great reduction of bulk, and facility of making packages of small weight. It can be supplied in compact cakes weighing as little as 20 lbs., while the cubic space occupied is only about one-third of the measurement of hay compressed in the ordinary manner, as supplied for consumption by horses and cattle on board ship, or for purposes of war. It has this further ad-

vantage, that the hay or other forage may be combined with oats or other grain in any proportions that may be desired. In this combined form it was supplied for the use of the Cavalry, Royal Artillery, and Military Train of her Majesty's army during the late war in China, and gave great satisfaction; the proportions used being 12 lbs. of hay and 10 lbs. of oats packed together in one cake, so that each cake contained one day's food for one horse.

[712]

FORDHAM, THOMAS, *Snelmore Hill, Newbury, Berks.*—Chidham wheat; Talavera wheat; prolific white-eye beans; potato oats.

[713]

FULLER, CHARLES, *Newnham Farm, Wallingford, Berks.*—Wheat—Newnham prolific.

[714]

HALLETT, FREDERIC FRANCIS, *The Manor House, Brighton, Sussex.*—Hallett's Pedigree Nursery wheat. (*See pages 62 & 63.*)

[715]

HENRI'S HORSE AND CATTLE FEED COMPANY, *London Bridge, London.*—Patent medicated horse feed and cattle condiments.

[716]

IRWIN, ELIZABETH, *Ballymore, Boyle, Ireland.*—Black oats.

[717]

KIRK & SWALES, *New Wortley, near Leeds.*—Grain, flour, and malt.

[718]

KITCHIN, JOSEPH, *Dunsdale, Westerham, Kent.*—Pocket of Golding hops.

[719]

LIVERPOOL COMMITTEE OF THE INTERNATIONAL EXHIBITION OF 1862, *Liverpool.*—Imports and their appliances.

[720]

MACKEAN, WILLIAM, *St. Mirren's, Paisley.*—Corn flour and starches.

[721]

PACK, THOMAS HENRY, *Ditton Court, Maidstone, Kent.*—Pocket of hops.

[722]

PAINE, CAROLINE, *Farnham, Surrey.*—Pocket of best Farnham hops; one small case of ditto.

[723]

PALING, W. & E., *Newark, Nottinghamshire.*—Cattle food and cattle condiment.

[724]

POLSON, WILLIAM, & Co., *Paisley.*—Patent Indian corn flour; starch from rice, Indian corn, and sago flour.

[725]

RAYNBIRD, CALDECOTT, & BAWTREE, Seed Merchants, *Basingstoke.*—Specimens of seed-corn and seeds.

[*Obtained Prize Medal, 1851.*]

[726]

ROBINSON, BELLVILLE, & Co., *64 Red Lion Street, Holborn, London.*—Patent barley and patent groats.

The exhibitors are manufacturers of patent barley, patent groats, pearl barley, oatmeal, groats, &c.

[727]

SIMPSON, ALEXANDER, *Steam Mills, Snow Hill, Birmingham.*—Condimental food for cattle, for rearing and feeding.

[728]

STEVENS, RICHARD, *Collyweston, Northamptonshire.*—Wheat, barley, beans, and oats.

[729]

STRANGE, WILLIAM, *Banbury, Oxon.*—Wheat and beans.

[730]

STYLES, THOMAS, 148 *Upper Thames Street*.—Ashby's groats for making gruel in a few minutes.

[731]

SUTTON & SONS, *Royal Berks Seed Establishment, Reading*.—Collection of seeds and specimens of grasses, &c.

[*Obtained Medal and Certificate at the Great Exhibition of 1851.*]



The exhibitors are seedsmen by appointment to Her Majesty the Queen, and his late Royal Highness the Prince Consort : also to the Government Gardens of India, and the Royal Agricultural Society of the Cape of Good Hope.

One thousand of the most distinct and popular varieties of seeds with English and botanical names. Dried specimens of one hundred species and varieties of grasses grown separately in one plot of ground, by S. & Sons. Specimen

clusters of twelve distinct sorts of African imphee or sorghum. A collection of cones and seed pods gathered from useful and ornamental trees in various parts of the world. Exact representations of various agricultural roots, which have taken distinguished prizes at the principal agricultural meetings of England, during the autumn of 1861.

Among the one thousand sorts of seeds exhibited will

be found one hundred and twelve sorts of grasses, one hundred and twelve sorts of various farm seeds, two hundred and twenty-four sorts of kitchen garden seeds, four hundred and fifty sorts of flower seeds, several varieties of cotton, and numerous sorts of fruits both English and Foreign.

The illustrations contain, among many others—

Sutton's champion Swedish turnip.

Skirving's Liverpool Swedish turnip.

Hardy purple-topped Swedish turnip.

Sutton's greentop yellow turnip.

Sutton's purple-topped yellow turnip.

Lincolnshire red-topped turnip.

Sutton's imperial green globe turnip.

Yellow globe mangel-wurzel.

Elvetham long red mangel-wurzel.



[732]

TAUNTON, WILLIAM, *Redlynch, Salisbury*.—Corn and seeds.

The exhibitor can supply agricultural seeds and seed corn of the finest qualities, such as the samples exhibited.

Prices may be learned on application at No. 97 Seed Market, Mark Lane.

[733]

TAYLOR, JOHN, & SONS, *Bishop's Stortford, Herts*.—White, coloured, amber, and brown malt.

[734]

THORLEY, JOSEPH, *Newgate Street, City*.—Thorley's food for cattle—a condiment ; Thorley's feeding meal—corn substitute.

[735]

WEBB, RICHARD, *Culham House, Calcot, Reading*.—Mummy Talavera wheat ; varieties of cob-nuts and filberts grown at Calcot.

[736]

WELLSMAN, JOHN, *Moulton, Newmarket*.—Pale malt chevalier barley ; oats ; barley grown from oats.

[737]

WOOLLOTON, C., & SONS, 246 *Borough*.—British and foreign hops.

[738]

WRENCH, JACOB, & SONS, *London Bridge, E.C.*—Favourite English cereals, &c., of the London Corn Market.

[739]

WRIGHT, ISAAC, & SON, *Great Bentley, Essex*.—Grass, ferns, and agricultural seeds.

The exhibitors have been engaged for the last thirty years in the collection of the British grass seeds, with a view to the permanent improvement of pastures. References are permitted to a number of gentlemen who have

obtained fine pastures by the use of the seed supplied by Wright and Son. Price 3s. per acre. They also supply agricultural seeds of every description.

HALLETT'S PEDIGREE NURSERY WHEAT,

HALLETT, FREDERIC FRANCIS, *The Manor House, Brighton, Sussex.*—Hallett's Pedigree Nursery wheat.

"BRED" ON THE SAME PRINCIPLE OF REPEATED SELECTION WHICH HAS PRODUCED OUR PURE RACES OF ANIMALS.

ONE OF THE

Date of
Planting,
1857:
Dec. 17



ORIGINAL TWO EARS.

Containing together 87 grains.

One grain produced
10 ears, containing

The finest 10 ears that could be selected from the
whole produce of the other 86 grains contained

1858:
Oct. 22 .. 79 76 74 73 69 68 66 60 55 = 688

70 67 63 63 63 60 57 52 52 51 = 598

One grain from this ear
produced 17 ears (be-
sides 5 green ones),
containing

Continued for one year
more, but abandoned,
as the produce was
evidently inferior.

AFTER TWO YEARS' REPEATED SELECTION.



The Ear containing 91 grains.

1859:

Sept. 19 91 87 86 76 75 74 72 67 67 65 64 63 61 58 = 1190

One grain from
this ear produced
39 ears, containing
2,145 grains.

Other 1,188 grains produced
1 3/4 bushels on 698 square
feet, or 13 1/2 quarters per
acre.

One grain from
this ear produced
15 ears containing
1086 grains.

1860:
Oct. 4... 74 } 71 * 2,000 = 2145

One grain from this ear }
produced 52 ears.

This produce selected on
account of "tillering"
powers of parent grain.

* Owing to the extraordinary season (1860),
the crop was so beaten about and injured by
the wet, that the two ears given separately,
"74," "71," were the only perfect ones in this
"stool," which was selected on account of the
number of its ears; the other "stool" was se-
lected on account of the contents of its ears.

87 } 86 81 80 80 78 74 70 67 67 66 65 62 62 61 = 1086

One grain from
this ear pro-
duced 24 ears
containing 1909
grains.

† 123 106 105 97 95 92 88 85 84 81 80 79 78 75 71 68 67 66 66 64 64 62 50 = 1909

1861. ACTUAL SIZE AFTER FOUR YEARS' REPEATED SELECTION.—LONGEST EAR.



PLANT EARLY.—One Bushel amply sufficient for Four Acres if Planted as Directed, the First Week in September.

FIFTH STARTING-POINT, 1861.

†BEST EAR. THE EAR CONTAINING 123 GRAINS. PLANTED SEPT. 19, 1861.



Grains in one
side of this
ear.

SUB-CLASS B.—*Drysaltery, Grocery, &c.*

[752]

BAKER, SIMPSON, & Co., *Cork, and Thames Street, London.*—Biscuits manufactured by patent steam machinery.

[753]

BARNES, MORGAN, & Co., 156A *Upper Thames Street.*—Bottled fruits, jams, and pickles.

[754]

BATTY & Co., 15 & 16 *Pavement, Finsbury, London.*—Export oils, pickles, sauces, jams, bottled fruits, &c.

[*Obtained the Prize Medal in 1851, and Honourable Mention in Paris Exhibition, 1855.*]

MESSRS. BATTY & Co. prepare and pack for home use and exportation, every description of bottled, preserved, and dried fruits, jams, jellies, and marmalade: hams, tongues, sausages, preserved meat, and fish, potted meats, game, wild fowl, &c.; also rich sauces, foreign and English pickles, mustards, capers, olives, vinegars, salad oils, cayenne pepper, curry, &c. These goods will be sent free to any part of London.

[755]

BEATTIE, JOHN, & Co., 31 *Virginia Street, Glasgow.*—Raw, refined, and crushed sugars; the latter manufactured in Scotland, and superior to the former.

[756]

BEXFIELD & WOOD, 110 *Long Acre.*—Wedding cake.

[757]

BOLLAND, RICHARD, *Chester.*—Wedding cake. (*See page 65.*)

This brides' cake consists of three tiers resting on a stand. The first tier has four panels, bearing medallions in relief of Wisdom, Providence, Charity, and Innocence, from the original designs of Sir Joshua Reynolds. A rich frame surrounds each of the panels, and between them are niches with appropriate figures. The ornaments on this tier are chiefly Gothic. The second tier is an octa-

gon relieved by four porticos, ornamented with busts and Cupids; the latter supporting festoons of the rose, leek, shamrock, and thistle, with the Royal Arms of England. The third tier is circular, and ornamented with cornucopiæ, leaves, banners, &c. The whole is surmounted by a beautiful classic vase, containing a bouquet of flowers. The ornaments are all composed of green paste.

[758]

BOVILL, FREDERICK ANDERSON, Chemist, &c., 24 *Park Terrace, Regent's Park.*—Jellies, fruit syrups, and culinary essences.

Bovill's fruit essences, or concentrated syrups for summer drinks, balls, parties, &c., are prepared from the pure juices of the following fruits:—Raspberry, red currant, black currant, cherry, apple, gooseberry, Seville orange, mulberry, foreign and English pine-apples, lemon and ginger lemon (for ginger-beer), and may be had through all respectable chemists and grocers in the United Kingdom, in pint, half-pint, and quarter-pint bottles.

Bovill's pure ox feet and calves' feet jellies, containing highly nutritious matter, will be found well

adapted for invalids or the table. Calves' feet (sherry, madeira, punch, or noyau flavouring), ox feet (lemon, orange, vanilla, raspberry, cherry, red currant, strawberry and pine-apple), can be obtained in quart, pint, and half-pint bottles. These jellies are guaranteed to be prepared from the fresh feet, and flavoured with the choicest fruit, wines, &c., and are strongly recommended for their purity.

The above preparations are warranted not to contain any chemical fruit-flavouring whatever.

[759]

BROUGHTON, THOMAS A. B., & Co., *Bristol.*—Treble refined patent salt, in air-tight packages.

[760]

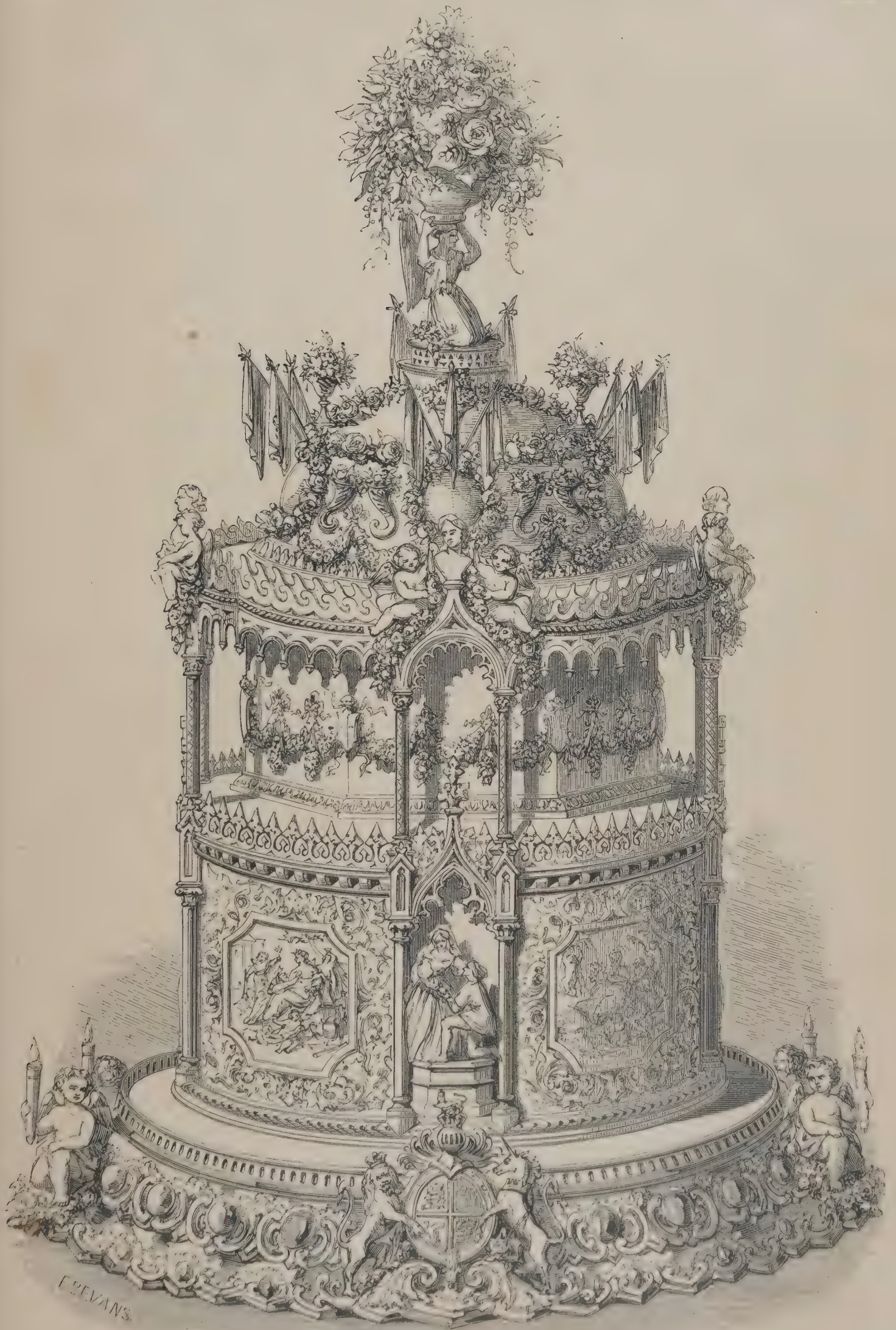
CADBURY BROTHERS, *Birmingham, and 148 Fenchurch Street, London.*—Chocolates and cocoas. (Makers by appointment to the Queen.)

[761]

CLARENCE, THOMAS, 2 *Church Place, Piccadilly.*—Manufacturer. Cayenne sauce.



This sauce is used as a relish to roast meat, game, poultry, steaks, chops, cutlets, fish, soup, gravy, &c. Its thorough adaptation to this purpose has won for it a first class among sauces, and extensive patronage in the houses of the nobility and gentry, and in the clubs. It is sold wholesale by the maker, and Crosse and Blackwell, and is retailed by the principal Italian warehousemen and sauce dealers throughout the kingdom.



BOLLAND'S WEDDING CAKE.

[762]

CLERHEW, WILLIAM, *Richmond Hill, Aberdeen* (late of *Ceylon, Coffee Planter*).—Drawing illustrative of his patent process of curing coffee.

[763]

CLYDE SUGAR REFINERS' ASSOCIATION, *Greenock*.—Samples of sugar-refining produce.

[764]

COCKS, CHARLES, *Reading*.—The celebrated Reading sauce; pickles, and other sauces.

[765]

COLLIER & SON, *Steam Mills, 10, Foster Street, Bishopsgate*.—Cocoa, chocolate, chicory, and coffee—roasted, raw, and dressed.

Messrs. Collier & Sons are coffee, cocoa, and chicory roasters (by their patent enamelled cylinders), chicory importers, and chocolate manufacturers.

The following specimens or samples are exhibited:—

Raw coffee as imported.

Raw coffee cleaned and dressed.

Roasted coffee not cleaned.

Roasted coffee cleaned and dressed.

Refuse taken from coffee in dressing.

Raw Dutch and German chicories as imported by J. C. & Son.

Dutch chicory, roasted by J. C. & Son's patent process.

Ditto nibs, ditto.

Ditto granulated, ditto.

Ditto ground, ditto.

Raw Trinidad cocoa-nuts.

Roasted Trinidad cocoa-nuts.

Roasted Trinidad cocoa-nibs.

Roasted Trinidad cocoa flaked.

Cocoas and chocolates of various descriptions, and Patent Chocolate Powder.

Collier & Son's chocolate powder is prepared from the finest Trinidad cocoa-nibs. The popularity which this article has attained, justifies the manufacturers in recommending it as one of the most agreeable, and at the same time nutritious, beverages that can be taken. It may be purchased from any grocer in London or the country, and wholesale at the steam mills of the manufacturers. Established in 1812.

[766]

COLMAN, J. & J., *26 Cannon Street, London, E.C.*—Mustard, starch, and blue.



The mustard of commerce is manufactured from mustard seed, of which there are two descriptions—black, usually termed “brown,” and white. It is grown in Kent, Essex, Lincolnshire, Cambridgeshire, Yorkshire, and Holland. The mode of preparation is as follows:—The seeds are crushed between rollers, pounded in mortars, and dressed through sieves of varied fineness; and, according to the fineness of the farina, it is designated “genuine,” “double superfine,” “superfine,” “fine,” “aromatic,” or “seconds.” Oil is extracted from the refuse or bran, and is used for burning, dressing cloth, &c., &c.; the cake is used as manure, and is by many preferred to other descriptions of cake, as it is thought materially to lessen the ravages of the fly and wireworm on turnips.



The mustard which is most confidently recommended, is made from the finest qualities of seed; it is pure flour of mustard, and is called “genuine,” and “brown;” the “double superfine” is made from the same description of seed, mixed with a very slight proportion of the best wheaten flour, and is by many preferred to the “genuine” on account of its more delicate flavour.

In the manufacture of other descriptions than “genuine” and “brown,” flour, tinted or stained by finely powdered turmeric root, is used.

Specimens.

Genuine mustard.

Double superfine mustard.

Flour of brown seed.

Flour of white seed.

Brown seed.

White seed.

[767]

COPLAND & CO., *30 Bury Street, St. Mary Axe, London*.—Preserved meats, fruits, vegetables, &c.

[768]

COXSHALL, JOHN, *Waltham Abbey, Essex*.—Gingerbread in various forms.

[769]

CROSSE & BLACKWELL, *Soho Square, London*.—Pickles, sauces, jams, fruits, and preserved provisions for all climates.

[770]
DAKIN & Co., 1 *St. Paul's Churchyard*.—Collection of teas.

[771]
DAWSON & MORRIS, 96 *Fenchurch Street, E.C.*—Isinglass.

[772]
DEWAR, THOMAS, *Newcastle-on-Tyne*.—Mustard, and process of manufacture.

[773]
DODSON, HENRY, 98 *Blackman Street, London*.—Improved patent unfermented bread; unfermented nursery biscuits; biscuit powder; cakes.

[774]
DORGUIN, ERNEST, 9 *Baker Street, Portman Square*.—Cho-ca, chocolate, and bonbons.

[775]
DUNCAN, A. M'E., & Co., *Gorey, Jersey*.—Preserved animal and vegetable substances.

[776]
DUNN & HEWETT, *Pentonville Hill, London, N.*—Lichen *Icelandicus*, or Iceland moss, and other cocoas. (*See page 68.*)

[777]
DU PARCQ, C., *Jersey*.—Manufactured cocoas in powder; Jersey cider in bottles.

[778]
ELDER, ALEXANDER, *Edinburgh*.—Royal Holyrood sauce.

[779]
FADEUILHE, V. B., 29 & 30 *Botolph Lane*.—Patent dry milk in powder.

[780]
FAHRMBACHER, M., 4 *Sion Square, E.*—Artificial confectionery.

[781]
FARMER, J., & Co., *Edgeware Road, W.*—Cocoa; cocoa fat refined.

[782]
FORTNUM, MASON, & Co., 180 *Piccadilly*.—Collection of preserved fruits.

[783]
FRY, JOSEPH STORRS, & SONS, 11 & 12 *Union Street, Bristol, and 252 City Road, London*.—Series illustrating the manufacture of chocolate and cocoa. (*See page 69.*)

[784]
GAMBLE, POWER, & Co., 78 *Fenchurch Street, London, and Cork*.—Preserved provisions, in hermetically closed tin cases.

[*Obtained the Prize Medal of 1851.*]

The exhibitors preserve meats, vegetables, &c., of all kinds, in hermetically closed cases; and warrant them to keep sound for years, and to be fit at any time for immediate use.

Price lists and testimonials from various celebrated authorities, naval and military commanders, Arctic voyagers, &c., can be had on application.

[785]
GARRARD, JOHN T., *Needham Market, Suffolk*.—Fine sugar-cured, smoked Suffolk hams; breakfast bacon, chaps, and ox-tongues.

[786]
HARRISON, R. & J., *Jack Lane Mills, Leeds*.—Pure Durham mustard, mustard seeds, and prepared chicory.

[787]
HART, J., *St. Mary Axe, City*.—Isinglass.

DUNN & HEWETT, *Pentonville Hill, London, N.*—Lichen *Icelandicus*, or Iceland moss, and other cocoas.

The "Iceland Moss Cocoa" is strongly recommended by medical men, on account of its nutritious properties, in cases of debility, indigestion, and pulmonary disease. It may be obtained of most grocers, price one shilling and fourpence per pound.

Dunn's Essence of Coffee will keep good in any climate. A cup of coffee can be made from the essence in one minute.

Dr. Hassall, Dr. Normandy, and others have testified to the genuineness of the manufactures of this firm.



[788]

HASSALL, A. H., M.D., 74 *Wimpole Street*.—Specimens illustrating the adulteration of food.

[789]

HAY, 6 *North Audley Street, Grosvenor Square*.—Improved Dutch rusks for invalids of weak digestion, and infants.

These rusks are recommended by some of the first members of the medical profession as a light and nutritious article of food, free from all tendency to acidity. To beef-tea (in which they immediately form, as it were, a uni-

form jelly) they are a most useful adjunct; while with tea or coffee they are an agreeable light repast for the invalid or convalescent. They can be forwarded in tin cases, price 5s. or 6s., to any part of the country.

FRY, JOSEPH STORRS, & SONS, 11 & 12 *Union Street, Bristol, and 252 City Road, London.*—Series illustrating the manufacture of chocolate and cocoa. [*Obtained Prize Medals at the Exhibitions—London, 1851; New York, 1853; Paris, 1855.*]



LEAF, FLOWER, AND FRUIT, OF THE THEOBROMA CACAO,
WITH POD OPENED.

I. *Botanical Specimens.*

1. Branches of the cocoa tree (*Theobroma Cacao*).
2. Leaves do.
3. Flowers do.
4. Pod cut open showing the fruit which forms the cocoa of commerce.
5. Section of the wood of the cocoa tree polished, and other botanical illustrations.

II. *Specimens of Raw Cocoa as Imported from various Countries.*

1. Cocoa from Caraccas.
2. Do. Guayaquil.
3. Do. Para.
4. Do. Bahia.
5. Do. Trinidad, very fine quality.
6. Do. do. fine red.
7. Do. do. light red.
8. Do. do. fair gray.
9. Do. Grenada, very fine.
10. Do. do. fair red.
11. Do. Dominica.
12. Do. St. Domingo.
13. Do. Jamaica.
14. Do. Africa,
and other varieties.

III. *Illustrations of the Stages of Manufacture.*

1. Roasted cocoa (Caracca).
 2. Do. (Trinidad).
 3. Do. (Grenada).
 4. The husk or "shell;" chiefly used in Ireland.
 5. Cocoa nibs; the kernel of the nut bruised and separated from the husk. In this form cocoa is extensively used, and when boiled, these nibs produce a clear and fine-flavoured Cocoa.
 6. Cocoa nibs ground; used as above, but more easily prepared for the table.
 7. Pure chocolate, made solely from the cocoa nibs.
 8. Pure chocolate, combined with sugar to produce cake chocolates and confectionery chocolates.
 9. Do. do. flavoured with vanilla.
 10. Mexican vanilla, fine quality.
 11. Bourbon do. do.
 12. Common vanilla.
 13. Chocolate in powder, rendered perfectly soluble in boiling water.
 14. Soluble cocoa.
 15. Cocoa with the oil extracted.
 16. The oil of the cocoa nut (or cocoa butter).
 17. Chocolate cast in moulds of various shapes.
 18. Iceland moss, for combining with cocoa, and other illustrative articles.
- IV. *Chocolate and Cocoa as sold by J. S. Fry and Sons.*
1. Fry's cake chocolate, first quality, not sweetened, known as "Churchman's."
 2. Fry's cake chocolate, and other descriptions of similar character.
 3. Fry's cake chocolate, first quality, with sugar, known as "Victoria Chocolate."
 4. Fry's cake chocolate, first quality, with sugar and vanilla, known as "Prince Albert Chocolate."
 5. Fry's cake chocolate, other descriptions of sweetened.
 6. Fry's chocolate confectionery in great variety, including sticks, drops, &c., packed in elegant boxes.
 7. Fry's chocolate creams, a delicious sweetmeat.
 8. Fry's soluble chocolate.
 9. Fry's chocolate or cocoa paste.
 10. Fry's chocolate in powder, in canisters.
 11. Fry's homœopathic cocoa.
 12. Fry's Iceland moss cocoa.
 13. Fry's rock cocoa.
 14. Fry's flake cocoa.
 15. Fry's soluble cocoa, in packets.
 16. Fry's pearl cocoa,
and other varieties of chocolate and cocoa.

[790]

HENTER, H., *Eccles on Street, Pimlico*.—Currie powder, vanilla, and essences.

[791]

HILL & JONES, *Jewry Street, Aldgate*.—Biscuits, lozenges, comfits, jujubes, boiled sweets, liquorice, fruit syrups, preserved peel, and jams.

[792]

HOWARD & CO., *Scott Street Mills, Hull*.—Howard's British laundry starch; Howard's Indian confection flour.

[793]

HUNTLEY & PALMER, *Reading and London*.—Biscuits for home and foreign trade; wedding and other cakes.

[794]

JAMES, JOSEPH ELLIS, *Birnam, Scotland*.—Birnam imperial sauce; volunteer sauce; Garibaldi sauce. (*See page 71.*)

[795]

JONES, RICHARD, & F. H. TREVITHICK, 30 *Botolph Lane, London*.—Azotized raw meat, poultry, &c.

[796]

KEILLER, JAMES, & SON, Confectioners, and manufacturers of marmalade and preserves, *Dundee*.—Confections, marmalade, and preserves.

[797]

LANGDALE, E. F., 72 *Hatton Garden*.—Ol. almonds free from prussic acid: culinary essences, syrups, liqueurs.

[Honourable Mention, Exhibition 1851.]

Concentrated fruit-syrup essences, prepared to keep in all climates, $\frac{1}{2}$ pts. 7s., pts. 12s. per doz.; culinary essences for flavouring, 8s. per lb.; dried herbs for flavouring soups 2s. to 6s. per doz.; essence of almonds free from prussic acid 8s. 6d. per lb.; compounds for flavouring liqueurs,

curaçoa, maraschino, &c., 20s. per lb.; compounds for flavouring American drinks, mint-julep, bull's milk, cock-tail, &c. 24s. per doz.; essence of gin and brandy, for making London gin and cognac brandy without use of a still 8s. per lb.; 1 lb. to 50 gals. of plain spirit.

[798]

LEBAIGUE, HONORÉ, 9 *Langham Street, London, W.*—Confectionery, gum-paste figures, and fancy goods.

[799]

LEWIS, J. R., 16 *Gould Square, City*.—Liquorice root and extract.

[800]

LIVERPOOL PRESERVED PROVISION COMPANY, *Liverpool*.—Provisions preserved in hermetically sealed packages.

The articles exhibited will retain their flavour and freshness in any climate for several years. By this process the sailor or passenger at sea, the soldier in the trenches, the yachtsman on his cruise, or the sportsman

on the Moors, can be supplied with fresh fish, soups, entrées, fowls, joints, vegetables, game, and fruit ready cooked, and capable of preparation for use when required.

[801]

MCCALL & STEPHEN, *Adelphi Biscuit Factory, Glasgow*.—Plain and fancy biscuits—machine made.

[802]

MCCALL, JOHN, & CO., 137 *Houndsditch, London*.—Preserved provisions.

[803]

MCCLELLAND, GEORGE, *Wigtown, N.B.*—Preserved potato, and extract of Irish hops.

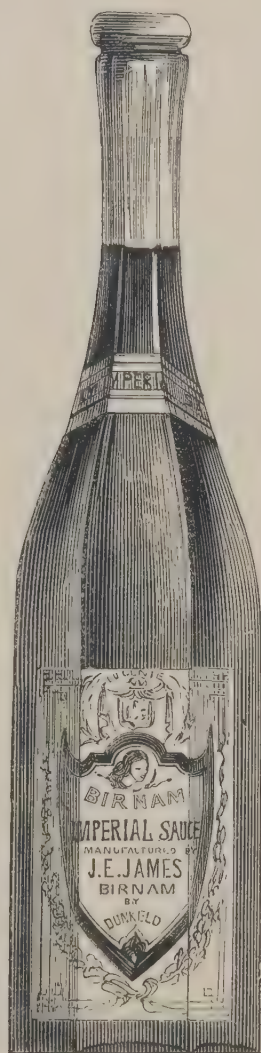
[804]

MCCRAW, EDWARD CHARLES, *Winsford, Cheshire*.—Patent steam-made salt.

JAMES, JOSEPH ELLIS, *Birnam, Scotland.*—Birnam imperial sauce; volunteer sauce; Garibaldi sauce.

These sauces are compounded of the purest and choicest ingredients, and do not depend upon cayenne pepper for their piquancy. The use of them is in the highest

degree consistent with health, as they materially assist the process of digestion, while stimulating the appetite. They impart a piquant flavour to cold meats, and an agree-



IMPERIAL
SAUCE

able relish to made dishes, ragouts, hashes, soups, and stews, and are eminently desirable as fish sauces. They may be purchased in London of W. James, Coliseum Hotel, Portland Road.



GARIBALDI
SAUCE



VOLUNTEER
SAUCE

[805]

MACKAY, J., 121 *George Street, Edinburgh.*—Quintessences from spices and herbs, and other culinary preparations.

[806]

MACKIE, JOHN WYSE, 108 *Princes Street, Edinburgh.*—Rusks and biscuits.

[807]

MAKEPEACE, SAMUEL, *Merton, Surrey, S.*—Preserved herbs, vegetables, and herbaceous mixtures, flavouring essences, &c.

[808]

MARSHALL & SON, *Tavistock House, Covent Garden.*—Lazenby's Harvey's sauce ; Dr. Witney's condiments ; pickles, sauces, &c.

[809]

MARSHALL, T. W., 2 *Richmond Terrace, Grosvenor Street, Camberwell, S.*—Crystallized liqueurs and creams.

[810]

MARTINEAU, DAVID, & SONS, Sugar Refiners, *London.*—Illustrations of sugar refining.

[811]

MOORE, E. D., & Co., *Wood's Eaves, Newport, Salop.*—Concentrated milk: its combination with cocoa and chocolate. Concentrated wort.

[*Obtained the Prize Medal at the Exhibition of 1851.*]

The prize medal was awarded to Moore's Patent Concentrated Milk, and its combinations with chocolate and cocoa, for their novelty, utility, and economy. They are prepared for use by the addition of boiling water only.

These preparations are extensively used by voyagers and invalids, and are found by all to be delicious and nutritive beverages. Joseph B. Bull & Co. are the sole preservers under E. D. Moore's patent. The farm and works are situated at Wood's Eaves, Staffordshire; the office and warehouse at Littleworth.

PRICES.

E. D. Moore's Patent Concentrated Milk (half-pint equal to 7 half-pints in liquid)	Half-pints per doz. }	15s.
E. D. Moore's chocolate and milk . doz. lbs. .		24s.
Do. do. . . . doz. ½lbs. .		12s.
E. D. Moore's cocoa and milk. . . doz. lbs. .		20s.
Do. do. . . . doz. ½lbs. .		10s.

[812]

MORTON, JOHN THOMAS, 104, 105, 106 *Leadenhall Street, London; Clayhills, Aberdeen, Scotland.*—Preserved provisions and jams.

[813]

MYZOULE, J. H., 72 *Southampton Street, Pentonville Road, N.*—Confectionery.

[814]

NELSON, DALE, & Co., *Bucklersbury, London; (Works) Warwick.*—Brazil and patent isinglass; gelatine; gelatine lozenges.

[815]

PARSONS, FLETCHER, & Co., *Bread Street.*—John's nutritious corn flour; Cowpe's dietetic and homœopathic cocoas.

[816]

PARTRIDGE, EDWARD, 22 *Leadenhall Street.*—Pickles, sauces, preserved fruits, preserved meats, &c., for exportation.

[817]

PEEK, FREAN, & Co., *Works, Dockhead, London, S.E.; City Offices, 37 Mark Lane.*—A variety of steam-made biscuits, &c.

In the manufacture of these biscuits, the latest improvements of practical science are combined with purity of ingredients, producing biscuits of intrinsic excellence, and agreeable appearance.

Pek, Frean, & Co. having paid special attention to the qualities most suitable for the colonies and other countries as well as for the home trade, can with

confidence recommend their selection to shippers. The advantages of their position enable them to execute all orders with promptitude. Goods for exportation are packed in air-tight tins to insure their arrival in good condition.

In all parts of the United Kingdom their biscuits may be obtained from respectable grocers and others.

[818]

PHILLIPS & Co., 8 *King William Street, City.*—Collection of teas.

[819]

RECKITT & Co., *Hull*.—Machine and fancy biscuits manufactured by steam-power.

[820]

ROBB, ALEXANDER, 79 *St. Martin's Lane, London, W.C.*—Infants' and invalids' food; wedding and other cakes, and biscuits.

[821]

SCHOOLING & Co., 14 *Great Garden Street, Whitechapel, London*.—Genuine confectionery in penny packets, &c.

[822]

SCOTT, WENTWORTH LASCELLES, *Westbourne Park, London, W.*—Table showing various articles of food and drink, and their adulterants.

[823]

SHACKLE, MARIA & RICHARD WILLIAM, 10 *Sussex Terrace, Camden Town*.—Ornamental confectionery in great variety. (*See page 74.*)

[824]

SMITH, SUTTIE, & Co., *Arbroath*.—A glass case containing lozenges, confections, jujubes, marmalade, orange and lemon peel, jams, and jellies.

[825]

SMITH, GEORGE, & Co., 23 *Little Portland Street, London*.—Isinglass, gelatine, and extract of calves' feet.

[826]

SPRATT, JAMES, 118 *Camden Road Villas, London*.—Patent dog-cakes, suitable for cats, poultry, and pigs.

[827]

STANES, J., 4 *Cullum Street, City*.—Coffee branches in various stages of growth.

[828]

THOMAS, E., *Ealing Lane, Brentford*.—Flowers in sugar.

[829]

TURNER, G. & R. H., 111 *High Street, Borough*.—Wedding cakes.

[830]

VICKERS, JAMES, 23 *Little Britain*.—Specimens of isinglass in the rough and manufactured state.

[831]

WARE, G. R., Manufacturer and Importer of French Confectionery, 11 *Marchmont Street, London*.—French chocolate and bonbons.

[832]

WARRINER, G., Instructor of Cookery to the Army, *Aldersholt*.—Preparations to facilitate cookery in all its branches.

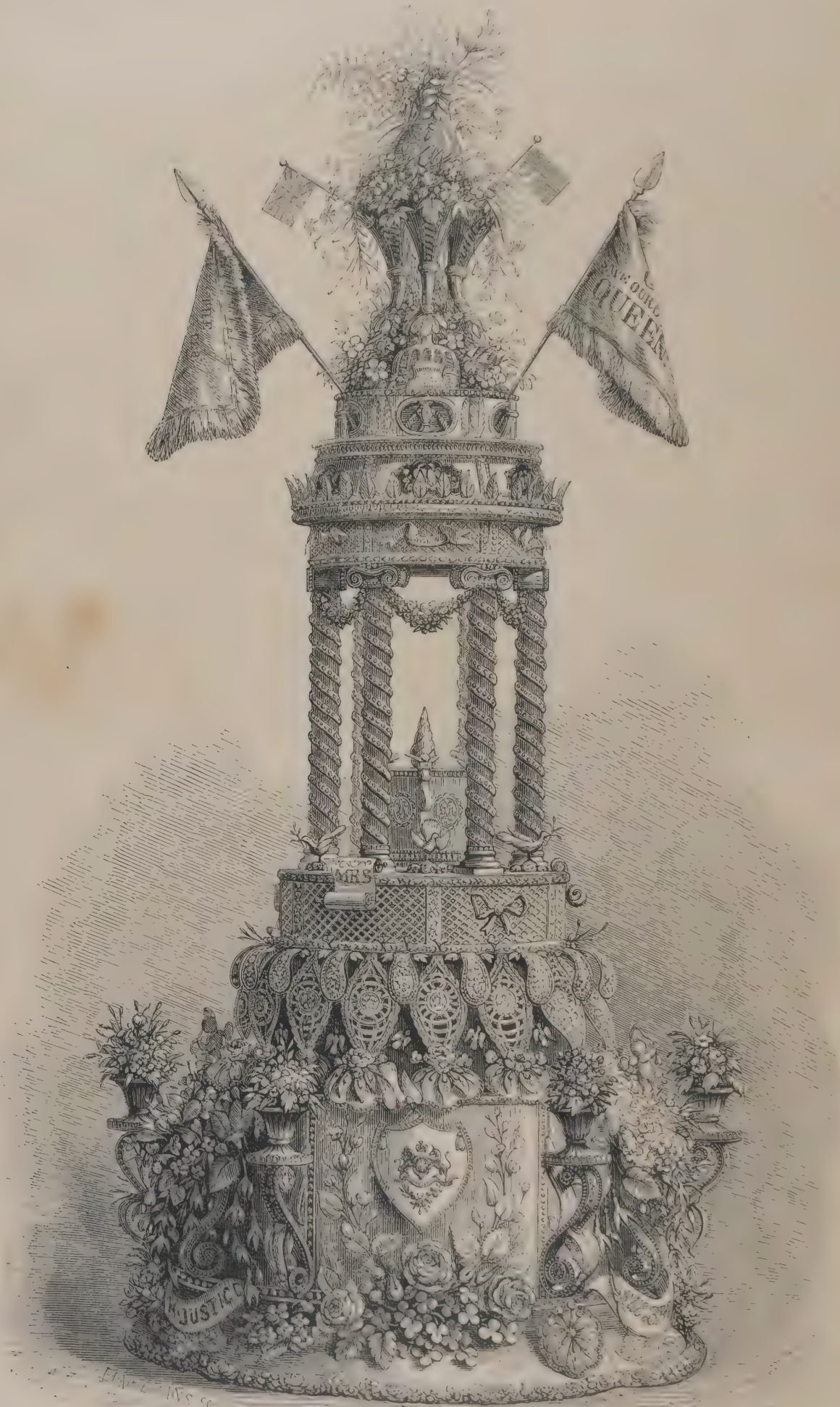
[833]

WEBSTER, JOSEPH MUNDAY, 58 *Pall Mall*.—Webster's "Royal Old English Sauce," for venison, fish, &c.

[834]

WESTON & WESTALL, 115 *Lower Thames Street*.—Refined salt.

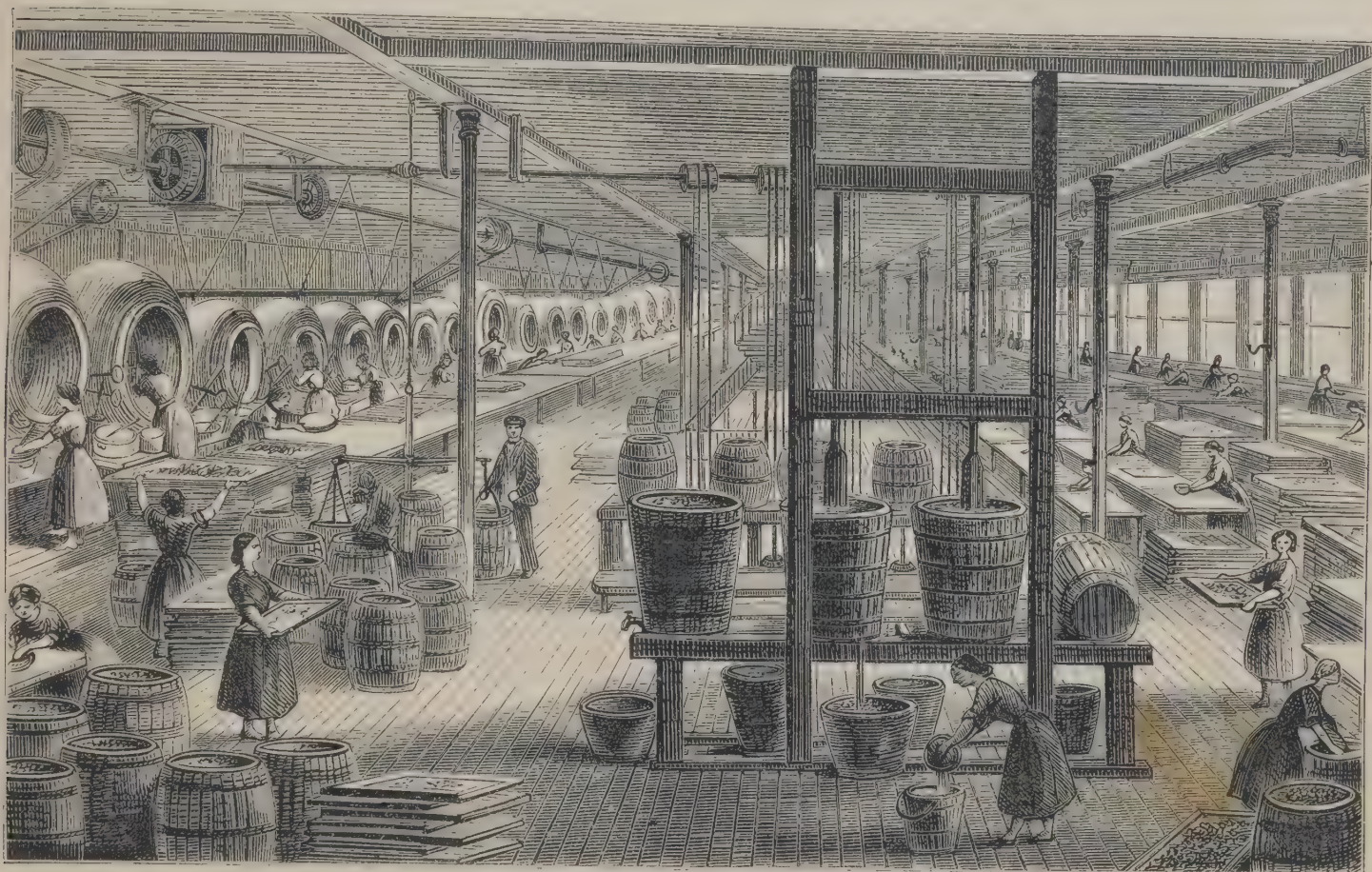
SHACKLE, MARIA & RICHARD WILLIAM, 10 *Sussex Terrace, Camden Town.*—Ornamental confectionery in great variety.



MARIA & WILLIAM SHACKLE have at all times a large variety of ornaments, for brides', Savoy, twelfth, christening, and birthday cakes. Besides the specimens exhibited

a further variety may be seen at their show-room. They supply and ornament bridecakes, conducting their business on ready-money principles.

WOTHERSPOON, ROBERT, & Co., *Glasgow and London.*—Wotherspoon's Victoria lozenges, uncoloured, in packets; general confectionery and marmalade.



The above engraving represents the manufactory of WOTHERSPOON'S VICTORIA LOZENGES, which are quite a novelty, a vast improvement in every respect upon the old-fashioned lozenges, and can only be produced in perfection by their Patent Steam Machinery.

To give purchasers a guarantee of their genuineness, and to prevent the possibility of having a spurious article palmed upon them, they send out these lozenges in packets only, which are labelled "Wotherspoon's Victoria Lozenges, and bear their full name and address. These packets are retailed at 1*d.*, 2*d.*, 4*d.*, 8*d.*, and 1*s.* 4*d.* each, respectively, which are the same prices as are charged for the ordinary inferior kinds, and are therefore beyond dispute entitled to universal preference,—a position which the demand for them proves they are rapidly attaining.

These lozenges are flavoured with peppermint, cinnamon, lemon, rose, musk, lavender, ginger, clove, and a variety of the purest essences, and are entirely free from all colouring matter.

The particular points of superiority of the Victoria Lozenges over the old-fashioned kinds are numerous, but the following are sufficient to be instanced here, viz:—

Their perfect cleanliness: being manufactured by self-acting steam machinery, they are entirely free from working of the hands, which is inseparable from, and so objectionable in, the old process.

Their improved shape: being quite smooth on the surface, and having no sharp edges like the ordinary lozenges, they have a much more pleasant feeling in the mouth.

Their purity: being manufactured from the finest sugar by a process which will not admit of adulteration, they can be used with perfect confidence.

Their safeness: being free from all colouring matter, they are uninjurious to the most delicate.

Their delicacy: being flavoured with the finest essential oils and essences only, they impart a most delightful taste to the mouth and fragrance to the breath.

Their guaranteed genuineness: the manufacturer's name being on every packet, purchasers are assured of the genuineness of the article.

Their moderate price: being retailed at the same price as the ordinary kinds, they are beyond dispute the cheapest confections made.

In short, they are injurious to none, beneficial to most, delicious to all, and are admired alike by adults and juveniles.

They may be obtained from grocers, druggists, confectioners, &c., and wholesale from the makers, Robert Wotherspoon & Co., Manufacturers of Scotch Marmalade and General Confectionery, 36 to 48 Dunlop Street, Glasgow, and 66 Queen Street, City, London.

[835]

WIGNALL, R. H., 98 *London Road, Liverpool*.—Royal original Everton toffee; improved original cocoa-nut ice.

The manufacture of the famous "Everton toffee" has been established one hundred and eight years. During this time it has been favoured with extended and exalted patronage; and in our own day has been supplied to Her Majesty and the Royal family, H. R. H. the Duke of Cambridge, the Right Hon. the Earl Russell, and other

distinguished consumers. The original formula for this popular sweetmeat has never been copied, and remains in the family of Molly Bushell, the first maker, of whom R. H. Wignall is a grandson. It is supplied in tin cases, which are kept ready packed, of various sizes, and despatched on receipt of draft or money order.

[836]

WOOD, GODFREY, 15 *Commercial Street, Leeds*.—Ornamental brides' cakes; ornamental christening cakes.

Subjoined is a price list of articles exhibited and manufactured by Godfrey Wood:—

Ornamental brides' cakes (as exhibited), 10 to 100 guineas.

Wedges for distribution (as exhibited), 3s. per lb.

Christening cakes, 2 to 10 guineas.

Yorkshire game pies for presents, 3 to 10 guineas.

The above articles can be sent (packed in cases) to any part of the United Kingdom, and will be guaranteed perfect on delivery.

The exhibitor contracts for wedding breakfasts.

Orders sent by post will be punctually attended to.

[837]

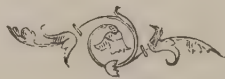
WOTHERSPOON, JAMES, & Co., *Glasgow and London*.—Lozenges and comfits made by machinery; Scotch marmalade, jams, &c.

[838]

WOTHERSPOON, ROBERT, & Co., *Glasgow and London*.—Wotherspoon's Victoria lozenges, uncoloured, in packets; general confectionery and marmalade. (*See page 75*).

[839]

WRIGHT, FRANK, *Kensington*.—Essences for summer beverages, made from fresh fruit only, unfermented, free from chemicals.



SUB-CLASS C.—*Wines, Spirits, Beer, and other Drinks, and Tobacco.*

[851]

ARCHER, JOHN ALEXANDER, *Broadway, Westminster*.—Tobacco; cavendish, negro-head, and roll.

[852]

BAKER, F., *Virginia Mills, Stockport*.—Manufactured tobacco and cigars.

[853]

BASS, RATCLIFF, & GRETTON, *Burton-on-Trent*.—East India pale ale; No. 3 Australian ale; strong ale.

The ales of BASS, RATCLIFF, & GRETTON may be obtained in butts (108 gallons), hogsheads (54 gallons), barrels (36 gallons), and kilderkins (18 gallons), from the brewery, Burton-on-Trent; from their stores, of which a list is subjoined; in cask, as well as in bottle, wholesale from all respectable wine and beer merchants; and retail, on draught, and in bottle from the licensed victuallers.

London... .. 3 Wharf, City Basin, E.C.

Liverpool 28 James Street.

Manchester 34 Corporation Street.

Dublin 66 Middle Abbey Street.

Cork 10 Lavitt's Quay.

Belfast 10 Hill Street.

Glasgow 43 Dunlop Street.

Newcastle-on-Tyne ... Trafalgar Goods Station.

Birmingham Newhall Street.

Stoke Company's Wharf.

Wolverhampton... .. Market Street.

Bristol... .. Tontine Warehouses, Quay Head.

Nottingham 1 Long Row.

Derby Corn Market.

Devon & Cornwall ... 42 Union Street, Plymouth.

Shrewsbury Wyle Cop.

[854]

BIGGS, AMBROSE, *Birmingham*.—Manufactured tobacco.

[855]

BOLLMANN, CONDY, & Co., 48 *Halfmoon Street, Bishopsgate, London*.—Malt vinegar; patent concentrated pure malt vinegar.

[856]

DYER, WILLIAM, *Littlehampton*.—British champagne, closely resembling foreign. Ingredients wholesome. Cost, only 2s. 4d. a gallon.

[857]

ENGLAND, GEO. JOS., *Dudley*.—Various descriptions of malt.

[858]

EVANS & STAFFORD, *Leicester*.—Stilton, Leicester, and Derby cheese; cigars and tobacco. (*See page 78.*)

[859]

FOWLER, J., & Co., *Prestonpans, N.B.*—Beer and India pale ale.

[860]

FRYER, DANIEL, *Epney, Stonehouse, Gloucestershire*.—Cider and perry.

[861]

GARRETT, NEWSON, *Aldeburgh, Suffolk*.—Patent crystallized malt.

[862]

GOODES, GEORGE & SAMUEL, 51 *Newgate Street, London*.—Cigars, tobaccos, and snuffs.

[863]

HEATLEY, JAMES, *Alnwick, Northumberland*.—Manufactured tobaccos.

[864]

HICKS, JOSH. R., *East Bergholt, Suffolk*.—English wines. Dr. Hassall's report, with prices, will be forwarded on application.

[865]

HILTON, ABRAHAM, *Barnard Castle*.—Rum shrub.

[866]

HOOPER, WILLIAM, 7 *Pall Mall East, S.W.*—Artificial mineral waters.

[867]

HUGGINS, EDWARD STAMFORD, 2 *Albert Street, Derby*.—Liqueur orange brandy.

[868]

HYAMS, MICHAEL, Manufacturer, *Bath Street, London*.—Collection, with models, illustrating improvements in the manufacture of cigars.

[869]

JONAS, EL., BROTHERS, 78 *High Holborn*.—Cigars and tobacco.

EVANS & STAFFORD, *Leicester*.—Stilton, Leicester, and Derby cheese ; cigars and tobacco.



The following makes of cheese, of which samples are exhibited, are selected from the finest dairies :—

Cream Stilton.
Leicester.
Ditto, Toasters.
Derby.

North Wilts.
American.
Choice Leicester hams.

Ditto Ox tongues.
Cheshire.
Cheddar.

Cheddar loaf.
Choice bacon.
Ditto lard in tins.



The exhibitors are manufacturers of the following Cigars :—

Cabanas.
Regalias.
Trabacas.
Lopez.
Kings.
Queens.
Regents.
Imperials.
Eminentes.
Principes.
Yaras.

La fragancias.
Sevillanas.
Pruebas.
Recompenzas.
Woodvilles.
La favorites.
Dy J. Patrons.
Cubas.
Partagas.
Salvadoras.
Eldorados.

Perfections.
La Floritas.
La Conchas.
Pillons.
Sultanias.
Emperors.
La Jarnas.
Unions.

Carallos.
Prince Consorts.
Manillas.
Pilots.
Bengals.
Mexicans.
Cigarros.
Esmeraldas.

They exhibit a case containing Havana, Giron and Esmeralda, Regalia, Trabuca and Great Easterns.

[870]

KENT, W. & S., & SONS, *Upton-on-Severn*.—French brandy and vinegar; British vinegar, cider, perry, cordials, and brandy.

Messrs. Kent exhibit the following home and foreign produce:—

Table and pickling vinegar, Nos. 18 and 24.
Choice cider and perry.

British brandy, and liqueur cordials.
Grande champagne cognac brandy, vintages 1851, 1855, and 1858.
First quality of French wine vinegar.

[871]

MART & Co., 130 *Oxford Street, W.*; (Wholesale) *Three Crown Square, Borough*.—Wines, preserved fruits, &c.

[872]

PITT & Co., 28 *Wharf Road, City Road, London*.—Pitt's patent tonic (aërated quinine) water.



This Aerated Water is the result of extensive chemical research, and has been submitted to several London physicians, from whom it has met with unqualified approval. It is considered by the proprietor to be of sufficient importance to patent, that being the only means by which the public can be protected against fraudulent imitations, and it is now offered under the most flattering testimonials. Its properties are antacid, cooling, and refreshing, combined with all the advantages of Soda Water; it gives strength to the stomach and tone to the whole nervous system, and is especially adapted to persons feeling depressed from mental or bodily excitement, imparting strength to those who suffer from nervous irritation, indigestion, or loss of appetite.

TESTIMONIAL FROM DR. HASSALL.

“Chemical and Microscopical Laboratory,
74 Wimpole Street, Cavendish Square, W.
19th December, 1863.

“I have carefully analyzed PITT'S TONIC WATER. The idea of combining a tonic like quinine with an

aerated water is a good one, and the practical difficulties in the way of carrying it out have been entirely overcome in this preparation.

“It is a pleasant, refreshing tonic, and invigorating beverage, strengthening to the digestive organs, and calculated to promote appetite; it is also an excellent restorative to the stomach weakened by any excess or indulgence.

“From its composition and properties, PITT'S TONIC WATER ought to a great extent to supersede the use of soda and other aerated waters.”

“ARTHUR HILL. HASSALL, M.D., Lond.”

Author of the Lancet Sanitary Commission; author of “Food and its Adulterations,” “Adulterations Detected,” and other works.

The tonic water may be obtained of Messrs. Veillard & Co., Eastern Area of the Exhibition. Numerous medical testimonials may be had on application.

[873]

RICHARDSON, SANDERS, & Co., *Hope Brewery, near Notting-hill Gate*.—A new description of beer.

[874]

SALT, THOMAS, & Co., *Burton-upon-Trent*.—Pale and Burton ales for home consumption and exportation.

[875]

SHARMAN, ALFRED, *Walham Green*.—Salagenic beverage (a new drink), made from fruit of the carob tree.

[876]

SILICATED CARBON FILTER COMPANY, *Bolingbroke Gardens, Battersea, S.W.*—Filtered liquors.

[877]

TAYLOR, HUMPHREY, & Co., *Shawfield Street, Chelsea*.—English liqueurs, cordials, and flavoured spirits.

Taylor, Humphrey, & Co. exhibit specimens of liqueurs, compounds, and spirits, manufactured and distilled by them, comprising the following, viz :—

Maraschino.	Crème de parfait amour.
Curaçoa, sweet.	Crème de rose.
Curaçoa, dry.	Crème d'abricot.
Crème de Noyau.	Anisette.
Crème de thé.	Ratafia.
Crème de vanille.	Extrait d'absinthe.
Crème de fleur d'orange.	Peppermint cordial.

Cinnamon cordial.	Curaçoa punch.
Cherry brandy.	Apricot punch.
Orange brandy.	Essence of punch.
Ginger Brandy.	Chartreuse.
Apricot brandy.	Pine-apple shrub.
Raspberry brandy.	Green ginger liqueur.
Orange bitters.	Aniseed cordial.
Milk punch.	Cloves cordial.
British brandy of very superior quality. Plain spirit, absolutely pure, manufactured by a new process.	

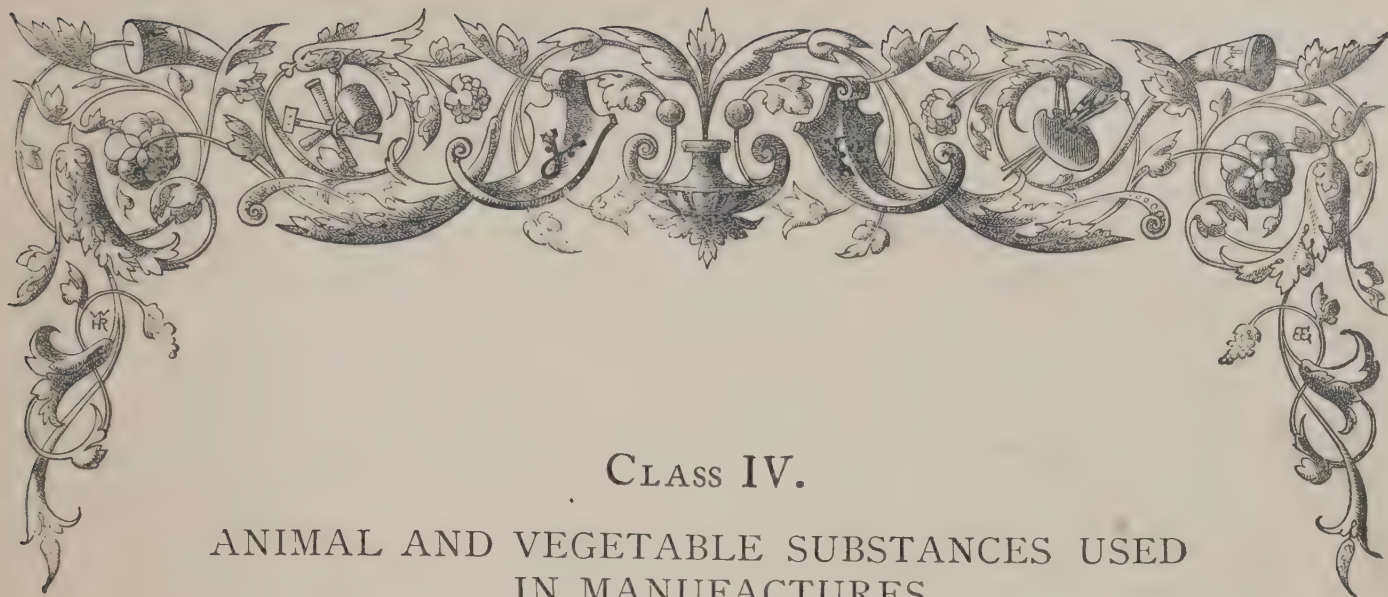
[878]

WALKER, ALFRED & WILLIAM, 3 *Peartree Street, Goswell Street, London*.—Exhibition ginger and British-made wines.

[879]

WILLS, W. D. & H. O., & SONS, *Bristol*.—Best bird's-eye, roll, and other choice tobaccos.





CLASS IV.

ANIMAL AND VEGETABLE SUBSTANCES USED IN MANUFACTURES.

SUB-CLASS A.—*Oils, Fats, and Wax, and their Products.*

[910]

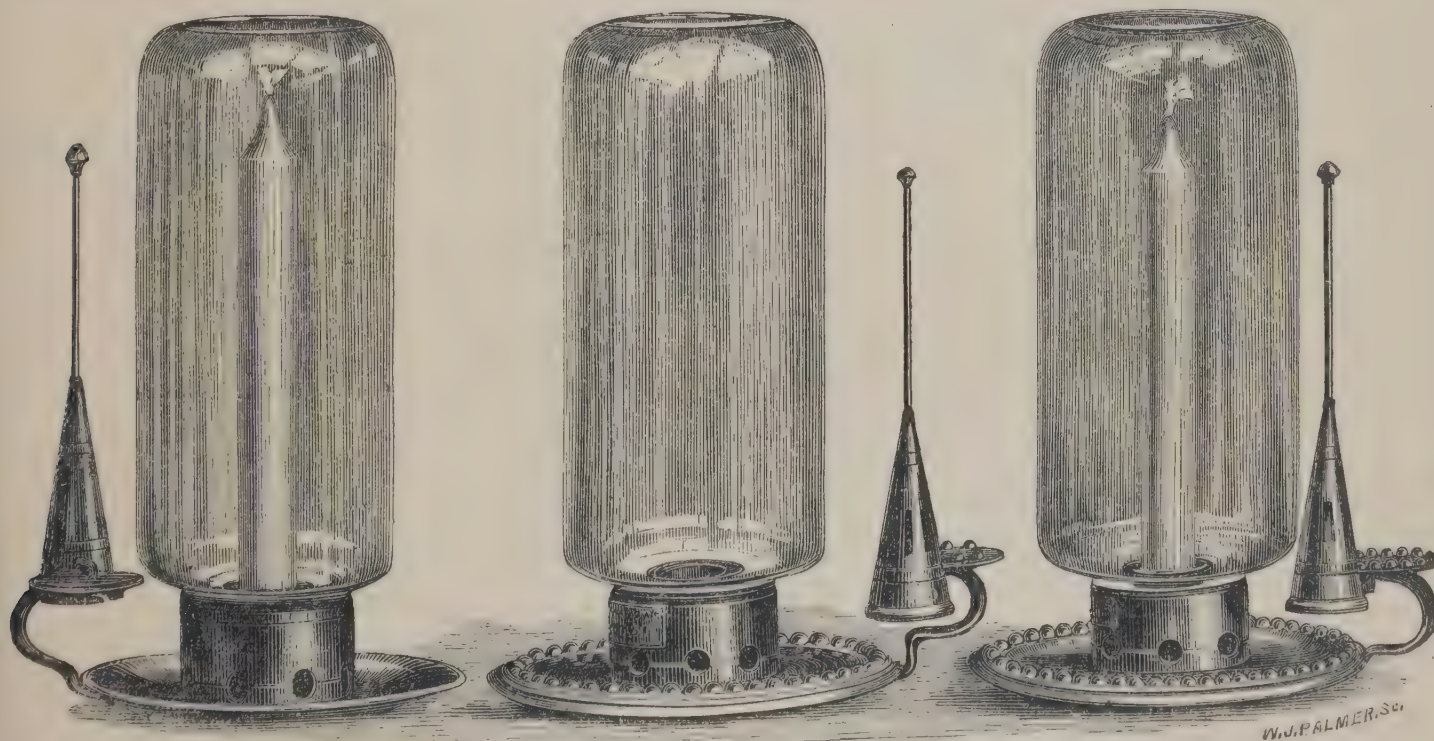
BARCLAY & SON, 170 *Regent Street, London*.—Bleached wax ; candles of various materials, night-lights, &c.

[911]

BAUWENS, FELIX LIEVIN, *Oil Works, 15 St. Anne Street, Westminster, S.W.*—Candles, soap, and oils.

[912]

BRECKNELL, TURNER, & SONS, *Haymarket, London*.—Shade for candlesticks.



The accompanying illustrations represent designs for shades for hand-candlesticks. The improved shade, A, is made with the upper part curved inwards, in order to prevent the too sudden ingress of air, which by deflecting the flame causes the grease or wax to melt too quickly ; the consequence of which is, that an uncovered candle, or even one protected by the ordinary shade, cannot be carried about without running over, and frequent spilling of the grease. The shape of the upper part of the registered shade shields the candle to a great

extent from the downward flow of air, and it may be carried along rapidly without the annoyance arising from guttering, and the liability of dropping the grease or wax about the room, or upon the dress. The lower part of the shade is fitted into the band or ring of metal, B, the size of which is made to fit the socket of the candlestick, to which the shade is to be applied. This improvement in the shade adds also to its ornamental appearance.

[913]

CANTRILL, THOMAS, & Co., *River Terrace, York Road, King's Cross, London*.—Railway and other greases.

[914]

CATTELL, DR., *Euston Square*.—Oils; fats, chemically treated; proofed fabrics; silk hat bodies; tracing cloths; anti-attribution compounds, &c.

[915]

CLARKE, SAMUEL, Patentee, *55 Albany Street, London, N.W.*—Pyramid night-lights, and pyramid night-lamps.



The superiority of Clarke's night-lights, consists in their giving double the amount of light and heat of other night-lights, and in their burning without flickering. They are admirably adapted for nursery use, for heating food, water, &c., and for lighting passages. They

will burn from seven to nine hours. Price $7\frac{1}{2}d.$ per box.

Pyramid night-lamps, 1s. and 1s. 6d. each.

Hot-water lamps, 2s. 6d. and 3s. 6d. each.

Pyramid food-warmer, 6s. each, complete with lamp, 7s.

[916]

COOK, EDWARD C., & CO., *Last London Soap Works, Bow, London*.—Yellow, mottled, curd, and soft soaps.

[917]

COWAN & SONS, *Hammersmith Bridge Works, Barnes*.—Samples of household soaps, and model of works.

[918]

FIELD, JOHN, CHARLES, & JOHN, *Upper Marsh, Lambeth, London*.—Paraffine, and stearine candles; sealing-wax; scented soaps.

The paraffine candles manufactured by Messrs. J. and C. Field far surpass all others, in brilliancy of appearance and in illuminating power. In support of this statement, the following is extracted from a report of an examination by Dr. Letheby:—"These results prove, that, weight for weight, the illuminating power of paraffine is rather more than 22 per cent. greater than that of spermaceti, about 40 per cent. greater than wax, 46 per cent. greater

than stearic, and 58 per cent greater than composite. Or, to estimate it in another way, the light produced by 98 lbs. of paraffine candles is equal to that of 120 lbs. of spermaceti, or 138 lbs. of wax, or 144 lbs. of stearic, or 155 lbs. of the best composite candles."

Field's celebrated "United Service Soap" may be purchased in the form of tablets, price 4d. and 6d. each.

[919]

GIBBS, D. & W., *City Soap Works, London*.—Specimens of manufactures; hard, soft, and scented soaps.

[Prize Medal at the Great Exhibition, 1851.]

Specimens of composite, household, extra pales, yellow, and marine soaps, for general use; curds and mottled for manufacturers; curds, palin, and patent soaps for the silk trade; the $\frac{BS}{M}$ soft soap (free from smell), as sup-

plied to H. M. Government, the Mail Steam Packet Companies, and the principal London hospitals; Naples tablets, old brown Windsors, honey, and various new kinds of toilet soaps.

- [920]
GOSSAGE, WILLIAM, & SONS, *Warrington*.—Specimens of soap and of silicate of soda.
- [921]
HALE, WARREN S., & SONS, 71 *Queen Street, London*.—Stearic acid; British sperm and composite candles.
- [922]
HEMANS, MRS. H. W., 4 *St. James's Terrace, Clarendon Road*.—Wax flowers.
- [923]
KNEVETT & AUSTIN, 22 *Mortimer Street, Regent Street, W.*—Flowers in wax and new materials.
- [924]
KNIGHT, J., & SONS, *Soap and Candle Works, Old Gravel Lane, E.*—Primrose soap.
- [925]
LAMBERT, ELIZABETH B., *Spring Villa, Tunbridge*.—A Kentish bank near Tunbridge, in July, modelled in wax.
- [926]
LANGTON, BICKNELL, & SONS, *Newington Butts, S.*—Sperm oil and spermaceti, in various stages of manufacture.
- [927]
LUMSDEN, ISABELLA, 8 *Trevor Terrace, Rutland Gate*.—Bouquet of wax flowers, in frame.
- [928]
MACKEAN, WILLIAM, *St. Mirren's, Paisley*.—Household and toilet soaps.
- [929]
MAKEPEACE, ELIZA, *Merton, Surrey, S.*—Wax flowers, orchidæ, anatomized leaves, and innocuous wax.
- [930]
MARSHALL, J. & W., *Selby*.—Oils and refined oils.
- [931]
MEECH, H. J., 3 *North Place, Kennington Road, Lambeth*.—Wax figures.
- [932]
MINTORN, J., 106 *New Bond Street*.—Models of flowers in wax, and materials used.
- [933]
MINTORN, JOHN HAYNES, 33 *Soho Square*.—Models of flowers in wax.
- [934]
MITTON, THOMAS, *Old Square, Blackburn*.—Improved dip and mould tallow candles.
- [935]
NEIGHBOUR, GEORGE, & SONS, 127 *Holborn*.—Specimens of oil for manufacturing and machine purposes.
- [936]
OGLEBY, C., & Co, 58 *Paradise Street, Lambeth*.—Refined spermaceti, paraffine, and stearic acid; with candles made of them.
- [937]
PENFOLD & MARTIN, *Tenison Street, Lambeth*.—Tubular candles.
- [938]
PIERSON, J., 66 *Mortimer Street, W.*—Flowers modelled in wax.
- [939]
PRICE'S PATENT CANDLE COMPANY (Limited), *Belmont, Vauxhall, London*.—Series of specimens illustrating improvements in the manufacture of candles, oils, night-lights, and glycerine.

[940]

RICH, W., 14 *Great Russell Street, Bloomsbury*.—Wax figures and flowers.

[941]

ROBIN & HOUSTON, *Paisley*.—Soap.

[942]

ROSE, WILLIAM ANDERSON, 69 *Upper Thames Street, London*.—Railway grease and other lubricating compounds; paints, varnishes, oils, &c.

Railway carriage grease for fast trains; grease for hot climates; lubricating greases for contractors' use and mining purposes; oils for lubricating, burning, and painting purposes.

Varnishes for coachmakers' and builders' use; white

lead, red lead, litharge, white zinc and colours for house-painters', ship-builders', and railway companies' use; anti-oxide for iron bridges; cotton waste for cleaning machinery; tar, pitch, and rosin.

[943]

ROWE, T. B., & Co., *Thames Soap Works, Brentford, W.*—Specimens of various soaps for domestic and manufacturing purposes.

The exhibitors are the manufacturers of the "Brentford mottled," "Imperial pale" toilet and other soaps for domestic purposes, and also of

1. White or curd soap.

3. White oil ditto.

2. Refined ditto.

4. Strong brown ditto.

5. Pure oil soap.

7. Scouring ditto.

6. Red palm ditto.

8. Strong mottled ditto;

and every variety used in the processes of manufacture by bleachers, clothiers, dyers, lace manufacturers and dressers, fine-paper makers, spinners, silk-throwsters, &c.

[944]

SENTIS, JULES, *Abercorn Street, Paisley*.—Stearine; oil and soap manufactured entirely from grease recovered from soap-suds.

[945]

SHIPLEY, MISS JANE, Teacher of Wax Modelling, 34 *Carter Street, Greenheys, Manchester*.—Flowers modelled in wax.

[946]

SYMONS, MRS., 9 *Devonshire Terrace, Notting Hill Gate*.—Wax flowers.

[947]

TAYLOR, WILLIAM, & Co., *Leith*.—Soaps, stearic acid, stearic acid and composite candles.

[948]

TREWOLLA, MRS. RICHARD, *Halesowen*.—Group of wax flowers.

[949]

TUCKER, F., & Co., *Kensington*.—Wax, sperm, stearine, composition, and bleached tallow candles. Specimens of decorated candles, and bleached tallow.

FRANCIS TUCKER & Co. are wax chandlers, candle manufacturers and oil merchants to the Queen, and His Royal Highness the Prince of Wales, 61 High Street, Kensington, and 18 South Molton Street, Grosvenor Square, London, W.

They are patentees of wax candles with platted wicks. Their manufactory at Kensington was established in 1730.

Price lists of candles, oil, soap, &c., sent on application.

[950]

WEST OF ENGLAND SOAP COMPANY (Limited), *Plymouth*.—Manufacturers', toilet, and domestic soaps; paraffine and composite candles. (See page 85.)

[951]

WILKINS, PRISCILLA, 49 *St. Paul's Road, Kennington, S.*—Wax flowers and fruit.

[952]

WILLIS, MARGARET H., *Marshside, Lower Edmonton*.—Wax flowers, ornamental leather work, and wax for making flowers.

[953]

WILLIAMS, JOHN, & SON, *Clerkenwell, London*.—Hard, soft, and fancy soaps, with illustrative and descriptive processes.

WEST OF ENGLAND SOAP COMPANY (Limited), *Plymouth.* — Manufacturers', toilet, and domestic soaps; paraffine and composite candles.

The following specimens are exhibited.

MANUFACTURERS' SOAPS.

SILK THROWSTERS.

- No.
1. White oil soap, for China silks.
2. Special mild curd soap, for Japan ditto.
3. Palm soap, for Bengal ditto.

SILK SPINNERS (WASTE).

4. Pure curd soap, for China and Japan silks.

SILK DYERS.

5. Best white soap, for fancy colours.
6. Brown oil soap, for blacks.
7. Brown oil soap, for boiling off.

No. WOOLLEN MANUFACTURERS.

8. White West of England soap, for milling and mellowing woollen cloths.
9. Brown ditto, for scouring.
10. Brown soap, for scouring sale yarn (Scotch market).
11. Brown soap, for worsted spinners and manufacturers.

CALICO MANUFACTURERS.

12. Vienna soap, for sizing calicos.
13. Feeding soap, for bed-ticks, Nankeens, &c.

CALICO PRINTERS.

14. Best oil soap, for madder reds, pinks, and madder purples.
15. White oil soap, for paper-makers.

Specimens of Silk, Woollens, and Calicos, in the manufacture of which the above Soaps have been used, are shown in the Company's Case.

TOILET SOAPS.

- | | |
|--|--|
| <p>No.
16. Transparent glycerine soap, being soap in its purest form, in pillars, shaving sticks, and tablets.
17. Finest toilet soap, variously and highly perfumed.
18. Treble-scented brown Windsor, in bars and slides.
19. Great improved brown Windsor, ditto.
20. Musk brown Windsor, ditto.
21. Extra brown Windsor, ditto.
22. Pure honey, ditto.
23. Otto of rose, ditto.
24. Lavender, ditto.</p> | <p>No.
25. Elder-flower soap, in bars and slides.
26. Turtle oil, ditto.
27. Pure glycerine, ditto.
28. Floating glycerine, ditto.
29. Almond and glycerine, ditto.
30. Sunflower oil, ditto.
31. Brown Windsor, in wrappers, made up to suit all home and foreign markets.
32. Soft soap.</p> |
|--|--|

DOMESTIC SOAPS.

- | | |
|--|--|
| <p>No.
33. West of England, best household soap.
34. Fine curd, for general use.</p> | <p>No.
35. Mottled, for scouring.
36. Marine, for salt-water purposes.</p> |
|--|--|

CANDLES.

- | | |
|---|--|
| <p>No.
37. West of England kohinoor.
38. West of England sperm.
39. West of England opaline.
40. West of England Ceylon wax.
41. West of England wax.</p> | <p>No.
42. West of England composite.
43. West of England carriage lights.
44. West of England ship lights.
45. West of England chamber candles.
46. West of England tapers.</p> |
|---|--|
47. West of England Night Lights.

SUB-CLASS B.—*Other Animal Substances used in Manufactures.*

[965]

AZÉMAR, J. C., *The Waldrons, Croydon*.—Specimens of ivory turning.



The centre piece is an allegorical work representing the Temple of Industry with all its attributes. As peace is essential to the pursuits and progress of sciences and arts, the emblems of war appear as if cast out from the precincts of the edifice. Religion being essential to the success and stability of all enterprises, the cross crowns the whole.

Temple of Industry, 80 guineas.

African black-wood cup, deep square pattern, 20 guineas; large ivory cup, 15 guineas; flat cup, with rhinoceros horn base, 15 guineas; cocus-wood cup, bound with ivory rings, and stem of African black-wood, pattern of superposed lozenges, 5 guineas.

African black-wood cup, bound with ivory rings, 8 guineas.

Oval ivory frame, deep open-work, 10 guineas.

Freemason's gavel, forming a hand-bell, 5 guineas.

Hollow, scented, wood ball, with light ivory stand, price 3 guineas.

Box top, deep open-work, with thistle centre, 4 guineas.

Ditto, with lighter work, 4 guineas.

Price of the case complete, 170 guineas.

Application may be made to Mr. H. Dixon, turner, 29 Gracechurch Street, City.

- [966]
BARNES, S. & T., 3 *Shouldham Street, W.*—Ivory, wood, and bone, hair, tooth, and nail brushes.
- [967]
BARRY BROTHERS, *Meriton's Wharf, London, S.E.*—English sheepskins, showing an improved growth of wool.
- [968]
BERENDT & LEVY, *Leeds.*—Samples of low wools.
- [969]
BERTHOLD & PHILLIPS, 31 *Gloucester Terrace, New Road, Commercial Road East.*—Tortoise-shell combs.
- [970]
BILLINGTON, MISSES, *Lord Street, Southport.*—Group of shell flowers.
- [971]
BUXTON, WILLIAM, *Limetree Lodge, Rotherhithe.*—Wools grown in the United Kingdom.
- [972]
CANTOR & CO., 6 *Houndsditch, London, N.E.*—Turkey sponges.
- [973]
COPE, R., & SONS, *Uttoxeter.*—Cabinet-makers' glue.
- [974]
COX, J. & G., *Gorgie Mills, Edinburgh.*—Gelatine and glue.
- [975]
DARNEY, JOHN, & SONS, Glue Manufacturers, *Kinghorn, Scotland, and Drury Lane, London.*—Scotch glue, sizing, &c.
- [976]
DOBSON, JOHN, Comb-maker, *Joseph Street, Leeds Road, Bradford.*—Buffalo-horn, and tortoiseshell combs.
- [977]
DORRIEN, CHARLES, *Ashdean, near Chichester.*—Merino wools grown in Sussex.
- [978]
DUTTON, T. R., 19 *Holywell Row, Shoreditch.*—Wood and ivory carvings and turnings.
- [979]
FENTUM, MARTIN, 85 *New Bond Street, W., and 8 Hemmings Row, W.C.*—Works in ivory and hard woods.
- [980]
FISHER, WILLIAM, & SONS, *Orchard Place, Sheffield.*—Umbrella, matchet, and knife handles of pressed horn.
- [981]
FOX, THOMAS BARKER, 37 *St. John Street, Devizes.*—Wiltshire Southdown fleeces, hog and ewe.
- [982]
GLASS, G. M., *Brandon Street, Walworth.*—Gelatine.
- [983]
GREEN, JOHN, 7 *Sherborne Street, Islington.*—Sheet gelatine used for tracing, wrappers for confectionery, and valentines.
- [984]
GURDON-REBOW, *Wyvenhoe Park, Colchester.*—Sheep's wool.

[985]

HASTILOW, CHARLES, 3 *Queen Street, Worship Street, E. C.*—Chessmen, draughtsmen, billiard and bagatelle balls, and fancy goods.

[986]

HEINRICH, J., *Lower Kennington Lane.*—Tortoiseshell combs.

[987]

HITCH, MARK, *Eversham, Worcestershire.*—Imitation tortoiseshell combs, which resist the action of damp atmosphere.

[988]

JACOB, BERNARD, 68, *Leadenhall Street, City, London.*—Shells and shell-work in all branches.

[989]

JAQUES, JOHN, & SONS, 102 *Hatton Garden, London.*—Fancy ivory goods.

[990]

JEWESBURY, H. W., & Co., 1 & 2 *Mincing Lane, E. C.*—Varieties of cochineal.

[991]

JOHNSON, PETER, Amateur Turner, *Wigan.*—Specimens of concentric turning in wood and ivory.

[992]

JOWITT & SONS, *Leeds.*—Wools.

[993]

LAMMLER, G., 2 *South Street, Finsbury.*—Carving in ivory.

[994]

LUBLINSKI, ROBERT, 183 & 185 *City Road.*—Carved ivory and other fancy handles for umbrellas, parasols, &c.

[995]

MANNINGS, GEORGE, *Wedhampton, near Devizes.*—Teg and ewe fleeces of South Down wool from Wilts.

[996]

MARLBOROUGH, DUKE OF, *Blenheim, Oxon.*—Oxfordshire Down wool, and blankets manufactured therefrom.

[997]

MASON, G., *Yateley, Hants.*—British silk and flax.

[998]

MILLER, HENRY, 4 *St. Edmund's Place, Bury St. Edmund's.*—Specimens of spiral turning by a patent lathe.

[999]

MOORE, WILLIAM SAL., 47 *Perceval Street, E. C.*—Ivory, bone, and wood, hair, tooth, nail, and shaving-brushes. (Illustrated process.)

Ivory hair, hat, and cloth brushes.
Ivory tooth, nail, and shaving brushes.
Ivory hand-glasses, and glove stretchers.
Ivory powder boxes, and shaving rollers.
Ivory paper-knives, tooth and nail rollers.
Ivory turnery and fancy goods.
Bone tooth and nail-brushes.
Bone shaving and fancy brushes of every description.
Wood hair-brushes veneered with ivory.
Satin rosewood and ebony hair-brushes of all varieties and qualities.

A very superior bone tooth-brush made for exportation, stamped and unstamped, and packed in boxes, always in stock.

Specimens of every stage of the manufacture of the above articles can be seen in detail in exhibitor's case.

W. S. Moore invites the special attention of merchants, shippers, perfumers, dressing houses, and all wholesale factors to the superior and extensive stock always on hand for selection.

[1000]

NIMMO, THOMAS, & Co., *Rivald's Green Works, Linlithgow, N. B.*—Superior glues and gelatine.

[1001]

NUPPNAU, EDMUND, 27 *Norfolk Street, Strand*.—Vases, cups, &c., turned in ivory.

[1002]

OLLEY, THOMAS GEORGE, 98 *Bolsover Street, London, W.*—General turnery and work by compound action lathe.

[1003]

PLAYNE, CHARLES, *Nailsworth, Stroud, Gloucestershire*.—Ornamental turning in ivory.

[1004]

PROCKTER & BEVINGTON, 124 *Grange Road, Bermondsey*.—London-made glues.

[1005]

PUCKRIDGE, F., 56 & 57 *Kingsland Road*.—Goldbeaters' skin.

[1006]

RICHARDSON, E. & J., *Newcastle-on-Tyne*.—Glues and gelatines.

[1007]

ROYAL AGRICULTURAL SOCIETY OF ENGLAND, 12 *Hanover Square, W.*—Wool.

[1008]

RYLEY, E. C., *Great Prescott Street, E.*—Specimens of amateur turnings in turnery and hard wood.

[1009]

SALOMONS, A., Amateur, *Old Change, E.C.*—Articles in ivory (turned).

[1010]

SAMUEL, M., 7 *East Smithfield*.—Shells, matting, canes, &c.

[1011]

SANDS, T. C., *Mortimer Street, Leeds*.—Burry wool cleaned by machinery.

[1012]

SASSÉ, P. C., 53 *Wynyatt Street, Clerkenwell*.—Looking-glasses, paper-knives, card-cases, chessmen, &c., in ivory.

[1013]

SISSON, JOHN, & SON, *Kendal*.—Mane, clipping, dressing, and small-tooth comb manufacturers.

"The horn comb manufacture is of considerable antiquity in this town, having been in existence more than a century, and is carried on with great spirit at the present time by Messrs. John Sisson and Son. This establishment has been in the same family since 1794, Joseph Sisson having founded it in that year. The firm maintains a high reputation for the production of a particular description of combs for horses, outrivalling,

perhaps, every other house in the trade throughout the kingdom in that article. London, Edinburgh, and Glasgow are the chief marts. Most of the combs are for domestic consumption; but some of the wholesale houses in London export Messrs. Sisson's produce. The manufacture is stimulated by a steam-engine and machinery of modern construction."—*Nicholson's Annals of Kendal*.

[1014]

STAIGHT BROTHERS, 35 *Charles Street, Hatton Garden*.—Specimens of patent coral: ivory combs, pianofore keys, &c.

[Obtained Prize Medal at the Exhibition of 1851.]

CORAL SUPERSEDED BY THE PATENT CORALLINE.

Specimens of Patent Coralline may be seen in Section I., Class IV. It is highly esteemed for jewelry purposes, and is also adapted for ornamenting works of art. Particulars can be had by applying to the patentees and sole manufacturers.

Messrs. Staight Brothers are also ivory merchants, and cut ivory for veneering in the spiral form; one length of veneer cut by them was exhibited in the London Exhibition of 1851, measuring 55 feet long; and being without a joint, obtained the prize medal. Messrs. Staight Brothers also manufacture ivory into combs, pianoforte keys, knife handles, chessmen, billiard balls, &c., &c.

STEWART, ROWELL-STEWART, & Co., *Aberdeen Comb Works, Aberdeen, and 13 Grocers' Hall Court, Poultry, London.*—Horn, tortoiseshell, and india-rubber combs.

The Aberdeen Comb Works are the largest in the world, covering upwards of two acres of ground, and employing 700 hands; but in 1854, when ladies' back combs were very much in fashion, these works employed 1100 hands.

The following extracts are from "Chambers's Edinburgh Journal," No. 396, 2nd August, 1851, and may be interesting to the general public. Since that time, however, there has been, along with many improvements, a great increase in the power of production.

"We come now to treat of the grand era in the comb trade—of the time when it was destined, like the great staple manufactures of our country, to undergo a revolution. The introduction into the trade of machinery and steam power, with, as a collateral result, the division of labour, is at once suggestive of an important stride in the march of progress. About the year 1828 Mr. Lynn invented a machine of a singularly ingenious design and construction, having for its principal object that of cutting two combs out of one plate of horn or tortoiseshell; and two years afterwards Messrs. Stewart & Co. commenced the manufacture in Aberdeen. To the first of these circumstances the trade was indebted for the successful idea of a machine, which effected at the same time a saving of half the material, and an increase of produce almost inconceivable. To the latter it is still more indebted for the first application of steam-power to the machinery; and, what we think of infinitely greater importance, the introduction of those true principles in the philosophy of production so logically contended for by Adam Smith, a philosophy which, in its legitimate application, has the invariable effect of elevating alike the character of the produce and the producers.

"There are two chief divisions in the second article, horn; namely, buffalo and ox horns, both of which are imported from various parts of the globe. Buffalo-horn is, however, for the most part used in the manufacture of knife-handles, and such-like articles in the cutlery trade. In comb-making it is chiefly used for dressing-combs; and, generally speaking, all combs of a deep black colour are formed of this material. The best buffalo-horns are obtained from the East Indies, and incomparably the finest are those of the Indian buffalo from Siam. We were shown a beautiful specimen of Siamese horns, which, from their extraordinary dimensions, had been preserved and polished. One of them measured 5 feet from tip to base, 18½ inches in circumference at the widest part, and weighed 14 lbs. Some conception may be formed of the extraordinary size of an animal which can support such a weight on the frontal-bone, if we recollect that a good specimen of an English ox-horn weighs only 1 lb.

"After taking a look at the steam-engine, which is of fifty horse power, and we were informed the largest of the horizontal kind in Scotland, we proceeded to the first stage of the manufacture, where the horns are cut into assorted sizes by means of a circular saw. A horn is twice cut transversely, and afterwards, if a large one,

longitudinally. The tips or extremities of the horn here cut off are sent to Sheffield, where they are converted into table-knife and umbrella handles; and in this operation 16,000 horns are cut up in a week. Instead of being divided in this manner, the hoofs in their first stage are, after being boiled for a certain time, to render the fibre soft, cut into two pieces; or rather the sole is stamped out by means of vertical punching-machines of the same irregular conformation. The specimens of elaborate and skilful ornamentation displayed here, especially on ladies' braid-combs, were truly admirable; and one pattern in particular was shown us wherein there was a species of chain, formed of beautifully-stained horn, interwoven with the head of the comb, which, although we examined minutely, and knew there must have been a joint in each alternate link, we nevertheless failed to discover it.

"The aggregate number produced of all these different sorts of combs averages upwards of 1200 gross weekly or about 9,000,000 annually; a quantity that, if laid together lengthways, would extend about 700 miles. The annual consumption of ox-horns is about 730,000, being considerably more than half the imports for 1850; the annual consumption of hoofs amounts to 4,000,000; the consumption of tortoiseshell and buffalo-horn, although not so large, is correspondingly valuable: even the waste, composed of horn-shavings and parings of hoof, which, from its nitrogenized composition, becomes a valuable material in the manufacture of prussiate of potash, amounts to 350 tons in the year.

"There are so many beautiful instances of the division of labour here exhibited, that the task of selecting is not easy. But let us take for an example the cheapest article in the trade; namely, the side-combs, sold retail at 1d. per pair—an article that, in its progress from the hoof to the comb—finished, carded, and labelled 'German shell' undergoes eleven distinct operations. This comb, then, which twenty years ago was sold to the trade at 3s. 6d. per dozen, can now be purchased in the same way for *two shillings and sixpence per gross!* thus effecting a reduction in price of about 1600 per cent.

"As a curious illustration of the value of labour, we give the following comparative estimate of the produce of the three materials:—

	Value. £		Value. £	Increase per cent.
1 cwt. of shell, 200 produces combs,	275		275	37½
1 ton horns,	56	" "	150	168
1 ton hoofs,	12	" "	36	200

Regarded in this aspect, in the relation of labour to material, we find that hoofs—intrinsically the least valuable of the three materials—become, with the application of labour, the *most valuable*—that is, proportionably; and the converse holds good in the case of tortoiseshell. The important relation labour bears to the produce may be estimated from the fact, that this establishment pays a larger sum of weekly wages than is now paid for the important business of cotton-spinning in Aberdeen."

[1016]

TUCKER, EDWARD, & Co., *Belfast, Ireland*.—Bleachers' starch, specially adapted for linens.

[1017]

TUCKER, H., *Fleet Lane, Farringdon Street, E.C.*—Goldbeaters' moulds; and skin for scientific and other purposes.

[1018]

VOTIERI, J., *24 Upper Park Street, Islington*.—Carvings in shell and stone.

[1019]

WRIGHT, FREEMAN, *Needham Market, Suffolk*.—Imperial and crown glues, made from pieces of hides and skins of cattle.

[1020]

YOUNG, B., & Co., *Spa Road, Bermondsey, S.E.*—Size, glue, and gelatine.



SUB-CLASS C.—*Vegetable Substances used in Manufactures, &c.*

[1033]

ADAMSON, R., Gardener, *Balcarres, Fifeshire*.—Baskets for fruits and cut flowers.

[1034]

AGAVA PATENT HAIR COMPANY, *Newlay, near Leeds*.—Fibre of the Agavé, raw and manufactured. (See page 92.)

[1035]

ALDRED, THOMAS, *126 Oxford Street, London, W.*—Bows, arrows, and archery accoutrements; fishing-rods and tackle.

[Obtained a Prize Medal at the Great Exhibition of 1851, and at New York.]

Thomas Aldred has been appointed manufacturer of archery accoutrements and fishing tackle to the Emperor and Empress of the French, the Emperor of Brazil, and the Queen of Denmark. He imports Italian and Spanish yew; is the maker of the celebrated glued-up triangular

rods; and manufactures bows, arrows, Thames rods, winches, lines, flies, &c. Catalogues may be obtained of these goods gratis. The prices of them are moderate, and they may be obtained in any quantity, wholesale, retail, or for exportation.

[1036]

ALLEN, M., *17 Percy Street, Bedford Square*.—Models of plants, showing the blossoms, seed vessels, &c.

[1037]

ANDERSON, R., *Dunkeld, Perthshire*.—Salmon and trout flies.

[1038]

BAILEY, JOHN, Wholesale Manufacturer of Woodware, *King's Cliffe, Northamptonshire*.—Butter-prints, taps, spoons, spice-boxes, &c.; bread waiters, &c.

[1039]

BAZIN, GEORGE, *9 Denmark Place, Wells Street, Hackney*.—Patent taper swan-quill floats and artificial bait.

[1040]

BELOE, WILLIAM LINTON, *Home Place, Coldstream, Berwickshire*.—Fishing-rods, reels, lines, flies, &c.

[1041]

BERNARD, J., *4 Church Place, Piccadilly*.—Fishing-rods, tackle, flies, &c.

AGAVA PATENT HAIR COMPANY, *Newlay, near Leeds.*—Fibre of the Agavé, raw and manufactured.



THE AGAVÉ PLANT.

1. Raw fibre of the agavé.
2. Undyed agava, prepared for stuffing.
3. Dyed agava, prepared for stuffing.
4. Glass box, containing 8 lbs. of agava, under a pressure of 30 lbs.
5. Model mattress with springs of the usual depth, stuffed with agava.
6. The same without springs.
7. Cushion covered with seating, woven and stuffed with agava.
8. Agava prepared for weaving.

The merit claimed for this substance is, that it is a perfect substitute for horse-hair, a long-sought desideratum, and one of growing necessity; indeed, there are few articles for which a substitute has been more needed than horse-hair. The increasing demand for upholstery, mattresses, &c., arising out of the luxurious habits of the time, has so enhanced the price as to render its use in anything like purity almost an impossibility. All kinds of adulteration have been resorted to, and numerous substitutes have from time to time appeared; but not until the substance now exhibited was adapted and perfected, was success achieved. The superior advantages of the agava are these:—It is half the price of the hair generally used; is much cleaner; will more effectually resist moisture; will not become matted; retains its inherent strength and elasticity; and thus entirely removes all excuse for the adulteration of horse-hair with pig and cow-hair—materials which, notwithstanding they are

known to be retentive of disease, vermin, and dirt, are now so generally used.

The agava fibre is extracted from the American aloe (*Agavé Americana*), a plant which grows wild in Mexico, and alone supplies this deficiency. It is a stemless plant, provided with large succulent spiny leaves, from the centre of which rises a flower-stalk of considerable height, bearing a magnificent head of large handsome flowers, sometimes as many as 4000 in number. In its native country the leaves are bruised and macerated in water, and afterwards beaten; their fibres are then separated and spun into a strong thread, from which rope, hammocks, fishing-nets, textile fabrics, and articles of clothing are made.

The ancient Mexicans employed it for the manufacture of paper, some of their curious MSS. being written on a material made from the fibre. The celebrated intoxicating beverage named *pulque* is also derived from this and other species of agavé, and from this beverage, again, a strong spirit, denominated *mezikal*, much resembling Scotch whisky, is distilled.

Attention has for some time been attracted to its applicability to various useful purposes; but it was not till a chemical process was discovered whereby its vegetable properties could be destroyed, that it was adopted as a stuffing material. By means of this process the fibre assumes a rounded form, and acquires a degree of strength, elasticity, and softness, previously unknown.

[1042]

BLACHE & Co., 21 *Wilson Street, Finsbury Square*.—Knife-cut veneers; walnut, rosewood, mahogany, and other woods.

[1043]

BLAKE, E., & Co., *Mill Street, Lambeth*.—Flax and Indian fibres, with woven fabrics from the same.

[1044]

BOLLANS, WILLIAM, Wood-Turner and Carver, *King's Cliffe, Northamptonshire*.—Wood turnings and carvings.

[1045]

BURLEY, ROBERT, & Co., *Glasgow*.—Patent steel-core and machine-made handles for hammers, picks, &c.

[1046]

CAMP, WILLIAM, 81 *Tottenham Court Road*.—Arm clubs, American pins and skittles, and other specimens of turning.

[1047]

CHEVALIER, BOWNESS, & SON, 12 *Bell Yard, Temple Bar, W.C.*—Fishing-rods and fishing-tackle.

The exhibitors have always in stock a large selection of superior salmon and trout rods, flies, &c., all of their own manufacture. They can supply complete cases, with sets of tackle, and flies, suitable for India, Canada, Norway, and all parts of the Continent. Their business has been established upwards of a century.

[1048]

CLARK, GEORGE F. H., & Co., *Camomile Street*.—Prepared resinous gums for varnish and hat manufacturing.

[1049]

CLARK & Co., 79 *Cannon Street West, London*.—India-rubber fabrics and felt. (*See page 94.*)

[1050]

CLARKE, JOHN ROBERT, 26 *Trafalgar Street, Walworth*.—Mosaic Tunbridge ware, inlaid with woods in their natural state.

[1051]

CLARKSON, T. C., 56 *Stamford Street, Blackfriars*.—Articles made in cork.

[1052]

CLEMENCE, HENRY, 55 *Upper Stamford Street, Waterloo Road, London, S.*—Specimens of cork, and corks manufactured by hand labour.

Specimens of various descriptions of manufactured corks :—

				Per gross.						Per gross.	
				s.	d.					s.	d.
Long claret corks, white	...	...	from	3	6 to 7 0	Black daffy corks	...	...	...	0	10 „ 1 3
Port and sherry corks, ditto	...	...	„	3	6 „ 6 6	„ phial ditto	...	...	...	0	4 „ 0 8
Ale and beer corks, ditto	...	...	„	2	0 „ 3 0	Homœopathic corks of all sizes	...	...	...	1	9 „ 2 0
„ „ black	...	...	„	1	9 „ 2 6	White and black shives, bungs, and taps supplied at the lowest current prices.					
Soda-water corks	...	...	„	2	0 „ 2 9	Wholesale and retail. Merchants and shippers supplied. Established 1851.					
Ginger-beer ditto	...	...	„	0	8 „ 1 6						
White daffy ditto	...	...	„	1	6 „ 2 6						
White phial ditto	..	..	„	0	6 „ 1 0						

[1053]

COHEN, CHARLES, 18 *Bury Street, City, E.C.*—Sticks; canes for umbrellas and parasols.

[1054]

COLES, WILLIAM FLETCHER, 52 *Aldermanbury, and 61 Paul Street, Finsbury, E.C.*—Cork and its compounds.

The following specimens are exhibited :—

Cork of various kinds and thickness. Cole's patent cork linings for the uppers of boots and shoes. Hat bodies. Thin cork for the inner soles of boots and shoes. Patent compound cork carpeting (Dunn's patent), plain or figured.

CLARK & CO., 79 *Cannon Street West, London*.—India-rubber fabrics and felt.

The following are exhibited, viz.—

1. Waterproof fabrics of all kinds; including single and double texture cloths and garments, Clark's patent ventilating waterproof garments, artificial card leather, blankets for calico printers, sheeting for waggon covers, and all kinds of vulcanized india-rubber fabrics.

2. Airproof fabrics; including Clark's patent airproof cushions, beds, and mattresses.

3. Vulcanized india-rubber for mechanical purposes; including valves, washers, packing, hose and tubing for steam, water, and gas purposes.

4. Vulcanized india-rubber thread for all descriptions of elastic web.

5. Vulcanized india-rubber in the sheet, in any length and 60 inches wide.

6. Manufactured rubber cut into sheets.

7. Artificial leather for bookbinding, paper-hangings, &c. &c.

8. Clark's patent india-rubber felt, for packing goods in bales and cases, for ship sheathing below copper, &c. &c. This new and valuable material is a combination of cotton wool, or fibres of flax, and india-rubber, forming a durable, cheap and waterproof fabric. The following interesting trial of its peculiar adaptation to the packing of goods was made at Lloyds', in London, and the following is a copy of a certificate signed by fifty members :—

"Lloyds", London, 28th June.

“ We, the undersigned members of Lloyds’, certify that we have witnessed the following trial of ‘ Clark’s Patent India-rubber Felt.’ Two bales of gray shirtings, packed by Messrs. Southgate & Co., were immersed for four days in water, in which a sufficient quantity of bay salt was dissolved, and on opening the bales, the goods packed with the india-rubber felt were found perfectly dry, while the goods packed with tarpaulin were quite saturated with water. The result is so satisfactory to us, that we have great confidence in the india-rubber felt, as a substitute for oilcloth and tarpaulin, and we will in preference insure goods packed in this material.

"We must also remark that the experiment of the wooden case lined with the felt, and containing several articles, was as satisfactory as the above."

[illegible]

[1055]

COLLYER, ROBERT HANHAM, M.D., F.C.S., *Alpha Road, N.W.*—Paper materials, raw to completed states, with machinery.

[1056]

COSSENS, EDWARD JOSEPH, 15 *Little Queen Street, Holborn.*—The Normandy basket-seller, with baskets carved in elder pith.

[1057]

COSSER, ROBERT, Fancy, Enamelled, and Gold Basket Manufacturer, 13 *Stucley Terrace, Hampstead Road.*—Specimens of fancy basket-work.

The productions of Robert Cosser may be procured from Miner's fancy repository, Lowndes Street, Belgrave Square, or from the manufacturer. They comprise the newest designs in gold rustic flower-baskets, flower-

stands, and ornamental stands of every description for the drawing-room. Ladies' work-baskets and work-tables lined with silk or satin, suitable for presentation, R. Cosser decorates basket-work after any design required.

[1058]

COTTON SUPPLY ASSOCIATION, *Manchester.*—Cotton samples, and cotton tree.

[1059]

COW, P. B., & Co., 46 *Cheapside, London.*—India-rubber waterproof fabrics, and vulcanized india-rubber goods.

[1060]

DAHMEN, M. A. J., *Park Villa, Peckham.*—Fibre and vegetable substances connected with textile fabrics and paper.

[1061]

DANKS, J., 56½ *Webber Row, S.*—New invented door mats, made of cocoa-nut fibre and wool.

[1062]

DEED, JOHN S., & SONS, 451 *Oxford Street, London.*—Cocoa mats, matting, and worsted hearth-rugs.

John Deed & Son are engaged in the several businesses of curriers, morocco, roan, skiver and calf leather dressers, manufacturers of sheep and lamb skin wool rugs, cocoa mats, matting, &c.

Examples of some of these manufactures will be found in Class XXVI., the following being exhibited in Class IV.

1. Specimens of mats for doors and entrance halls, made entirely from the fibre of the cocoa-nut.

2. Specimens of matting for churches, public buildings and offices, made entirely from the fibre of the cocoa-nut.

3. Specimens of mats made from cocoa-nut fibre, with coloured yarn or worsted borders in fancy designs.

4. Yarn and worsted hearth-rugs made to match carpets, tessellated pavements, &c.

[1063]

DIMSDALE, T. J., *Forest Lane, Forest Gate, Essex.*—Vegetable fibres for making paper, and paper made therefrom.

[1064]

DUFFIELD, JAMES, 12 *Great Chapel Street, Oxford Street, London, W.*—Embroidery and butter-stamp, pastry stand, gum-paste mould, and dairy utensil manufacturer.

[1065]

DUFFIELD, JOSEPH, 28 *Brandon Street, Walworth.*—Oval and round carved butter-stamps, and beaters with impressions.

[1066]

EVERARD, H. W., *Union Mills, Manchester.*—Vulcanized india-rubber brace, surgical, and other webs; braces, belts, &c.

[1067]

FARLOW, CHARLES, 191 *Strand.*—Improved fishing-rods and tackle; artificial bait; winches; swivels; split cane rods.

[1068]

FARRANT, RICHARD E., 16 *Queen's Row, Buckingham Gate*.—Carved bread, butter, and cheese plates; potato bowls.

[1069]

FAUNTLEROY, ROBERT, & CO., 99 & 100 *Bunhill Row, Finsbury, London, E.C.*—Foreign hard woods, dye-woods, fancy woods, &c.

Robert Fauntleroy & Co. exhibit a large model of the west front of the Royal Exchange, constructed of various specimens of hard and other woods, to the number of three hundred or more, together with the corozo nut or	vegetable ivory, coquilla, cahoon and betel nuts. The whole grouped and arranged so as to display the intrinsic merit of each, for turnery and other purposes.
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[1070]

FAUNTLEROY, ROBERT, & SONS, *Potter's Fields, Tooley Street, London*.—Foreign hard woods, ivory, and mother-o'-pearl shells.

[1071]

FORSTER, T., *Streatham, Surrey, S.*—Articles in vulcanite (ebonite), made from vulcanite india-rubber waste.

The exhibitor is the patentee of a mode of utilizing india-rubber waste.	to those manufactured from the best india-rubber, though the price is considerably less.
--	--

The whole of the black articles exhibited are produced from waste india-rubber, and will be found not inferior	The coloured samples for dentists' use are made from the best materials that can be obtained.
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[1072]

GATES, T. F., 31 *Lower Belgrave Street, Pimlico*.—Anatomized leaves.

[1073]

GIEHR, ROBERT, 4 *George's Row, City Road*.—Chairs and fancy baskets.

[1074]

GOGGIN, CORNELIUS, 13 *Nassau Street, Dublin*.—Irish bog-oak ornaments.

[1075]

GOUGH & BOYCE, 12 *Bush Lane, London*.—Kamptulicon—an improved elastic floor-cloth, warm, noiseless, and durable.

[1076]

GOULD, ALFRED, 268 *Oxford Street*.—Fishing-rods of cane, hickory, and other woods; eel traps, &c.

[1077]

GOWLAND & Co., 3 *Crooked Lane, London Bridge*.—Every description of fishing tackle.

[1078]

GUTTA PERCHA COMPANY, *Wharf Road, City Road*.—Articles in gutta percha. (*See page 97.*)

[1079]

HANCOCK, JAMES LYNE, 266 *Goswell Street, London, E.C.*—Vulcanized india-rubber for manufacturing, scientific, and domestic purposes.

[1080]

Hawe, J., 7 *Adelphi Terrace*.—Preserved natural flowers.

[1081]

HEEKS, MARGARET HANNAH, 61 *White Lion Street, Pentonville, N.*—Wicker baskets of every description, including a balloon car.

[1082]

HEINRICH, J., 36 *Lower Kennington Lane, S.*—Combs.

GUTTA PERCHA COMPANY, *Wharf Road, City Road.*—Articles in gutta percha.

[Obtained the Council Medal at the Great Exhibition of 1851.]



APPLICATIONS OF GUTTA PERCHA.

TUBING.

For conveyance of water.
Conveyance of chemicals.
Conveyance of liquid manure.
Watering gardens and streets.
Washing carriages, windows, &c.
Sprinkling water in maltings.
Suction pipes for fire-engines.
For ventilation.
Syphons.
Hearing apparatus for the deaf in churches and chapels.
Speaking-tubes in counting-houses, warehouses, shops, public institutions, on shipboard, and in mines.
Domestic telegraph in lieu of bells in private houses.
The medical man's midnight friend.
Speaking apparatus for omnibuses.
Railway conversation tubes.
Hogar pipes for mines.
Alarum tubes for ditto.
Union joints and elbow pipes.

DOMESTIC, &c.

Soles for boots and shoes.
Chamber service.
Window blind cord, clothes' line.
Lining for bonnets.
Wine coolers.
Foot baths. House pails.
Noiseless curtain rings.
Ear trumpets, cornets.

FOR PUBLIC ESTABLISHMENTS.

Viz: Hospitals, Asylums, Workhouses, Schools, Prisons, &c.
Bowls and soap dishes.
Water jugs and basins.
Drinking-cups. Fire buckets.
Chamber utensils.
Speaking tubes.
Night pans, bed ditto, bed slips.
Waterproof canvas.

ELECTRICAL, &c.

Covering for electric telegraph wires.
Insulating stools.
Battery cells.
Handles for discharging rods.
Electrotype moulds.
Galvanic batteries.

SURGICAL.

Splints. Caustic holders.
Thin sheet for bandages and dressings. Stethoscopes.
Ear trumpets. Bed straps.
Bed pans and bed slips for invalids. Pessaries.
Medical man's midnight friend. Vagina tubes.
Male and female urinals.

CHEMICAL.

Carboys. Stopcocks.
Vessels for acids, &c.
Syphons. Lining for tanks.
Tubing for conveying oils, acids, alkalies, &c.
Flasks, bottles, jugs. Acid pumps, pourers, and scoops.
Funnels.

FOR OFFICES, &c.

Inkstands. Ink cups (in lieu of glass). Pen trays.
Cash bowls. Tubes for conveying messages.
Architects' and surveyors' plan cases.
Washing basins, &c.

MANUFACTURING.

Buckets. Mill bands.
Pump buckets, valves, clacks, &c. Washers.
Pumps for acids. Oil cans.
Felt edging for paper makers.
Bosses for flax mills. Flax holders. Shuttle bcds for looms. Covers for rollers.
Bowls for goldsmiths.
Round bands and cord.
Breasts for water wheels.
Cutting boards for glove makers.

GUTTA PERCHA COMPANY—*continued.*

AGRICULTURAL.

Tubing for conveying liquid manure. Stable buckets.
 Spreaders for liquid manure.
 Lining for manure tanks.
 Driving bands for thrashing-machines, &c.
 Stuffing for horses' feet.
 Probangs for cattle. Whips.
 Dumb jockeys. Saddle brackets, anti-crib-biters.
 Bridle and harness hooks.

MINING.

Hogar pipes. Miners' caps.
 Speaking-tubes. Syphons.
 Tubes for ventilation.
 Pump buckets. Valves and clacks. Alarum tubes.

DECORATIVE, &c.

A variety of mouldings in imitation of carved oak, rosewood, &c., for the decoration of rooms, cabinet work, &c. Brackets.

Picture frames. Mirror frames.
 Daguerreotype frames.
 Mourning card frames.

FANCY ARTICLES.

Counter trays. Baskets.

Manufactured by the Gutta Percha Company, Patentees, and sold by their wholesale dealers in town and country.

Whips. Vases, shells.

Watch stands.

Ornamental inkstands.

Card, fruit, pin, and pen trays.

Bouquet holders. Paper weights. Bread trays.

Biscuit trays. Toilet trays. Vine trays. Cotton trays.

Pin cushions. Decanter stands. Snuff-boxes.

Tobacco boxes.

MISCELLANEOUS.

Fire buckets. Tap ferules.

Coloured material for amateur modelling.

Cricket, bouncing, and golf balls. Police staves.

Guards for fencing sticks.

Life-preservers. Paper for damp walls. Beds for paper cutting machine knives.

Fringe for mourning coaches.

Skates. Bottling boots.

Corrugated sheet for wine packing. Talbotype trays.

Official seals. Dolls.

Powder flasks.

Collodion baths and dippers.

Washers for carriage wheels. Ditto for cold water pipes.

Welting cord for ladies' dresses. String boxes.

Chessmen. (May be used for the game of draughts.)

[1083]

HINKS, JOSEPH, 64 *George Street, Birmingham.*—Hard and soft wood turnings.

[1084]

HODGES, R. E., 44 *Southampton Row, Russell Square.*—Patent india-rubber accumulators or springs.



These springs stretch to six times their normal length, and are made of any degree of strength, from 1 lb. up to 500 horse-power. They are used in printing, agricultural, sawing, and other machinery. They are also used for

mineral-boring and well-sinking, working at very high velocities instead of counter-balancing weights; and for giving the softness of a spring to rotary machinery, drums, cylinders, &c. They are largely used for door springs. They can be adapted for driving machinery, boats, light locomotives, &c.; for cable and towing springs; and for preventing jerk, jolt, jar, shock, and vibration generally.

[1085]

HOLLINGSWORTH & WILLOUGHBY, 2 & 3 *Wenlock Road, N.*—Veneers cut by their patent knife machinery.

[1086]

HOOPER, WILLIAM, 7 *Pall Mall East, S.W.*—Vulcanite and vulcanized india-rubber goods.

[1087]

HORSEY, JAMES, 36A *Belvidere Road, London, S.*—Articles in india-rubber, plain and coloured, for personal use, &c.

[1088]

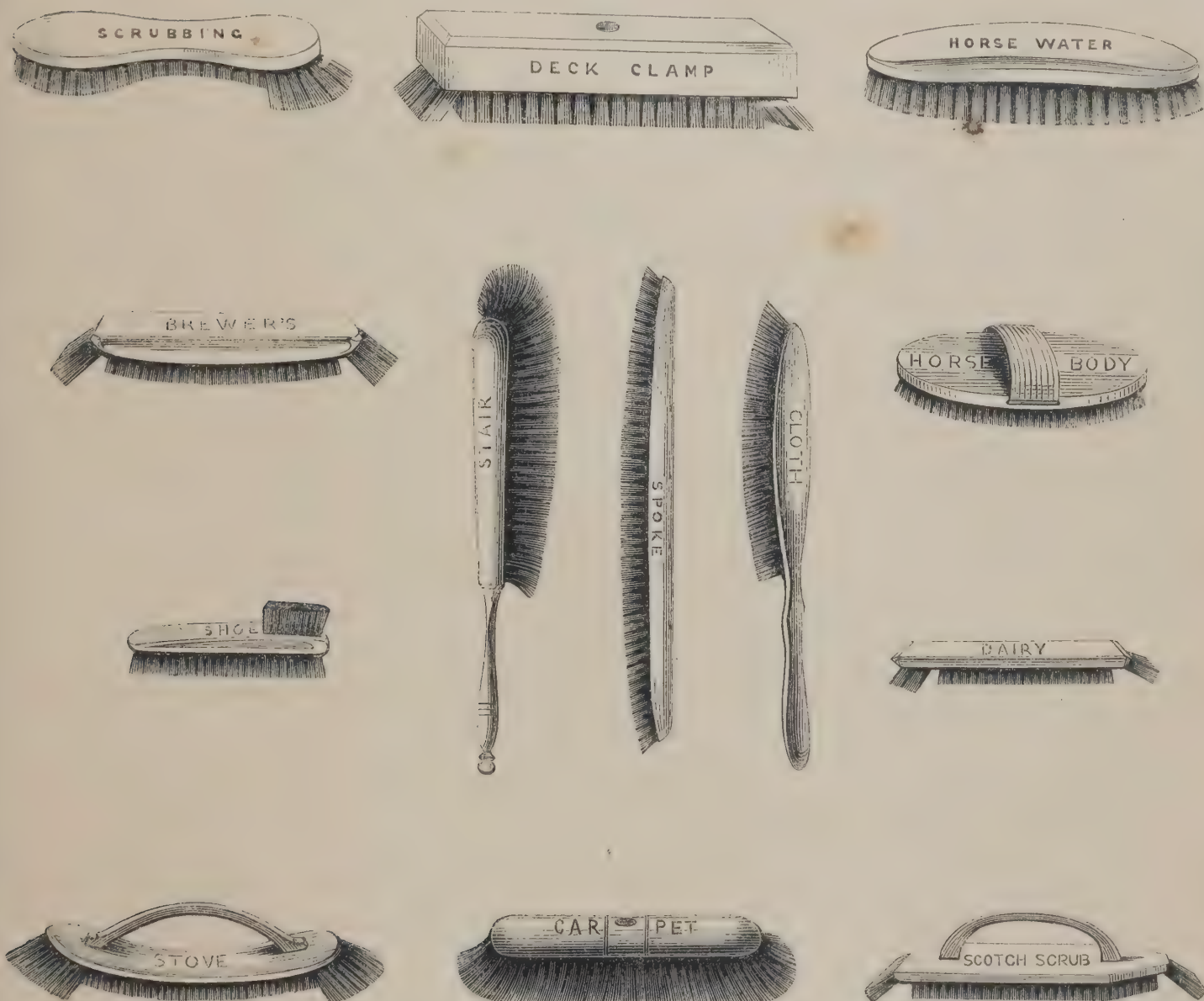
HOWARD, J., *London Road, Luton, Beds.*—Blocks for shaping ladies' hats and bonnets.

[1089]

HYAMS, MICHAEL, *Bath Street, London.*—Prepared thistle-down—proposed substitute for silk, and for other useful purposes.

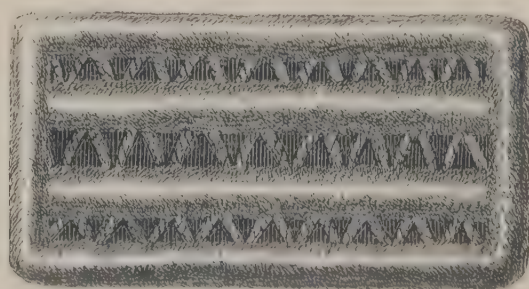
[1090]

HYDE, EDMUND, *Kingston-on-Thames*.—Barsham's patented cocoa-nut fibre brushes, and mats made therewith.



Brushes of every description are made of Barsham's Patent Cocoa Fibre. Their great durability, and very moderate price, have established their value and caused an increasing demand for them. To prevent imposition by

brushes of an inferior quality being sold for Barsham's, every patent fibre brush is stamped
"J. Barsham's Patent,
Kingston-on-Thames."



Mats made of Barsham's Patent Cocoa Fibre are also in great repute.

[1091]

JAMES, JOHN, JUN., 1 *Cleveland Terrace, Bath*.—New models of basket-work.

[1092]

JONES & CO., 111 *Jermyn Street, London, S.W.*—Salmon and trout rods, reels, lines, flies, &c.

[1093]

KING, FRANCIS, 56 *Wells Street, Oxford Street, London*.—Brooms for sweeping; horse brushes and other kinds made from piassava or bass.

[1094]

KOLLE, H., & SON, *Glensford, Suffolk; Queen Street, Cheapside, London*.—Cocoa-nut fibre manufactures.

[1095]

LATARCHE, PETER, 18 *Coldbath Square, Clerkenwell, London*.—Wickered flasks and baskets.

[1096]

LEATHER-CLOTH COMPANY (Limited), 56 *Cannon Street West, London*.—Leather-cloth. (See pages 102 & 103.)

[1097]

LEE, T., 33 *Old Street, London*.—Life-preserving swimming-vest, which will keep the wearer upright when exhausted.

[1098]

LENTON, RICHARD, 7 *Bartholomew Street, Exeter*.—Wicker flower-stands and bird-cages.

[1099]

LUDBROOK, S., *Bancroft Place, Mile End*.—Dressed piassava or bass, with brooms and brushes made of the same.

[1100]

MACKAY, A., 107 *High Street, Edinburgh*.—Wicker-work articles.

[1101]

MACINTOSH, CHARLES, & CO., *Cannon Street, London; Cambridge Street, Manchester*.—India-rubber in all its various applications and conditions. (See page 101.)

[1102]

MCNEILL, F., & CO., *Bunhill Row, London*.—Asphalted roofing, ship sheathing, and dry hair felts; compound vulcanized rubber for steam joints; kamptulicon.

[1103]

MADDEN, SUSANNA, 56 *Long Lane, West Smithfield, E.C.*—Skittles; skittle and round balls.

[1104]

MASON, G., Esq., *Yately, Hants*.—Specimens of flax and silk cultivated at Yately, Hants.

[1105]

MEYERS, B., *Mill Lane, Tooley Street*.—Canes, sticks, whips, &c.

[1106]

MORLEY, JOHN, 12 *Currington Street, Nottingham*.—Artificial salmon and trout flies.

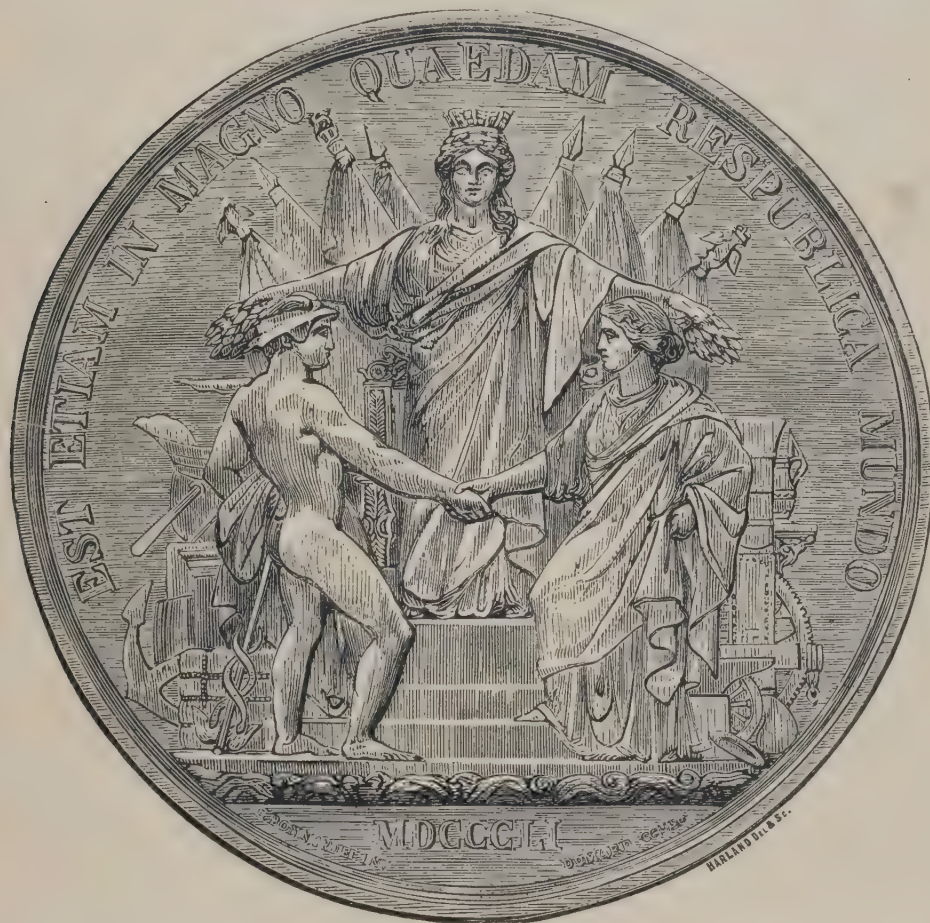
[1107]

MORRIS, CHARLES, 4 *Mountnod Square, Lewisham Road, Greenwich*.—Combs, comb-making tools, and fancy baskets.

[1108]

NOBLE, G. & J. A., 4 *George Yard, Lombard Street*.—Textile fibres.

MACINTOSH, CHARLES, & Co., *Cannon Street, London; Cambridge Street, Manchester.*—
India-rubber, in various applications and conditions.



[*Council Medal awarded at the Great Exhibition of 1851.*]

Charles Macintosh & Co. are the patentees of the vulcanized india-rubber, and manufacturers in general of caoutchouc articles.

The following is a summary of the articles exhibited :—

IN CLASS IV.

India-rubber, raw, and in progressive stages of manufacture; varnishes; waterproof and air-proof fabrics; elastic thread and general india-rubber manufactures.

CLASS V.

Railway buffers and bearing springs; carriage blocks and springs; wheel tires; locomotive hose, &c.

CLASS VIII.

Mechanical articles for stationary and marine engines; joint rings; printers' blankets; artificial card leather; hose; tubing, &c., &c.

CLASS XVII.

Surgical and hospital instruments and apparatus; vulcanite dental rubber, chemical articles, &c.

CLASS XXVII.

Waterproof clothing; military, naval, travelling, sporting, and veterinary.

CLASS XXIX.

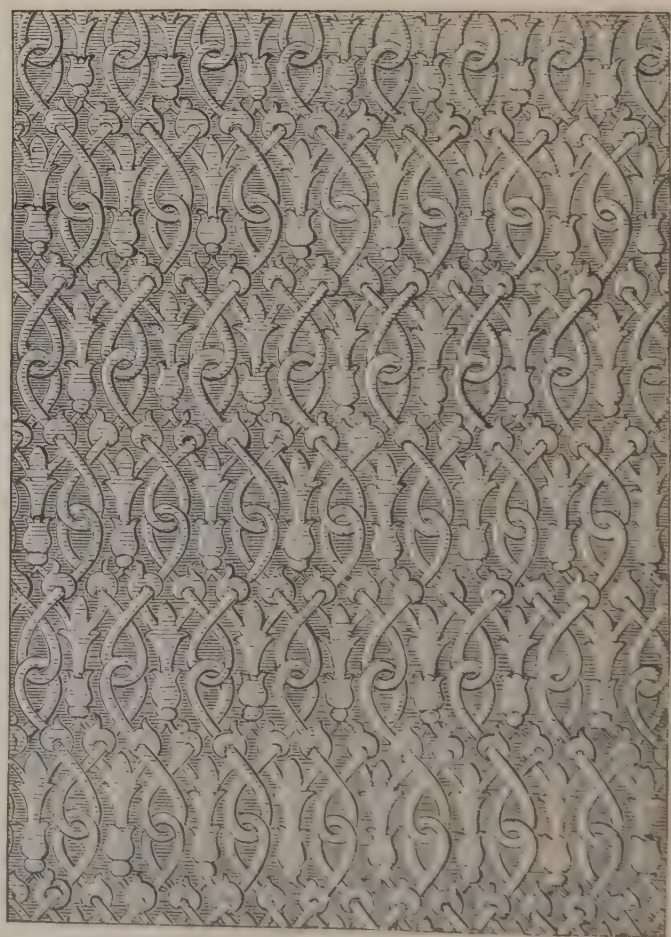
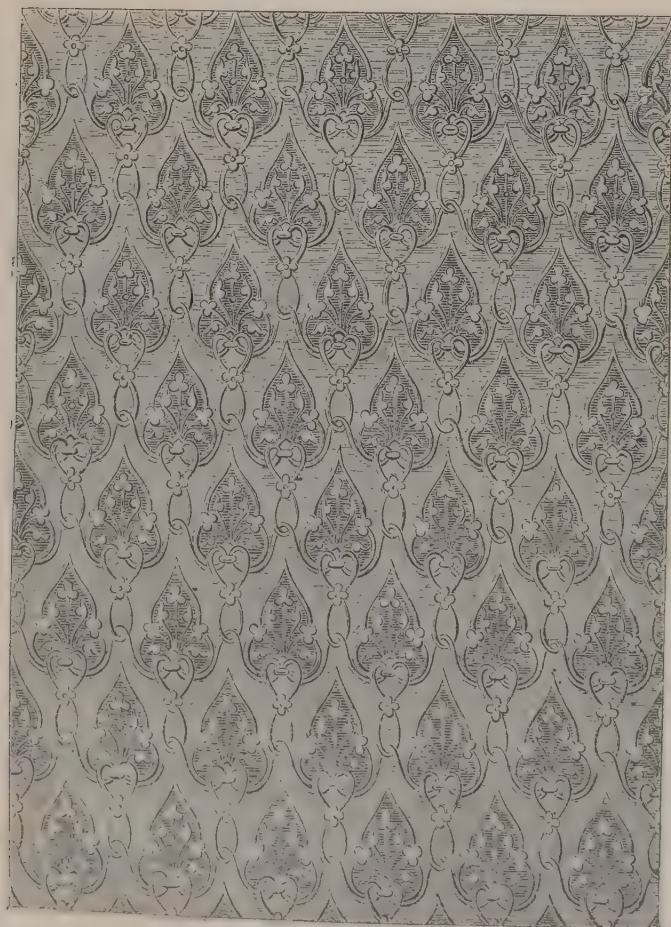
Educational appliances; inflated globes, maps, raised types for the blind, elastic bands, and other stationery.

For details see C. M. & Co.'s illustrated descriptive handbook of their manufactures.

3 Cannon Street West, London, E.C.; and Cambridge Street, Oxford Street, Manchester (C. M. & Co.'s only establishments).

LEATHER-CLOTH COMPANY (Limited), 56 Cannon Street, West, London.—Leather-cloth.

The Leather-Cloth Company (Limited) are the sole Manufacturers of Crockett's Leather-Cloth. Patent printed and gilded Leather-Cloth. Embossed Leather-Cloth.



PATTERNS OF LEATHER-CLOTH FOR WALL HANGINGS, &c.

LEATHER-CLOTH COMPANY (Limited)—*continued.*



PATTERNS OF LEATHER-CLOTH FOR WALL HANGINGS, &c.

These articles are extensively used both in this country and on the Continent for wall hangings, table covers, the seats of chairs and couches, for lining carriages, for fancy bags, hassocks, and numerous other purposes.

Many of the patterns of printed, gilded, and embossed Leather-Cloth combine all the beauty of gilded leathers with far greater durability and at about one tenth of the cost.

A. Lorsont, Managing Director. Warehouses—56 Cannon Street West, London. 104 Boulevard de Sebastopol, Paris. Works—West Ham, Essex.

[1109]

NORTH BRITISH RUBBER COMPANY (Limited), *Edinburgh*.—India-rubber manufactures; boots, shoes, and rubber for mechanical purposes.

[1110]

OLIVER, WILLIAM, & SONS, 120 *Bunhill Row, Finsbury, London*.—Specimens of fine mahogany and rare foreign woods.

[1111]

PACKER, ROBERT LEWIS, 38 *Union Street, Lambeth Walk, London, S.*—Improved glove stretchers, and powder-boxes.

[1112]

PARKES, ALEXANDER, *Birmingham*.—Patent Parkesine of various colours; hard, elastic, transparent, opaque, and waterproof.

[1113]

PEACH, J., & SONS, *Derby*.—Derby silk lines; registered improved salmon line.

[1114]

PETERS, W., & SON, 71 *Long Acre, London*.—Fishing-tackle.

W. Peters & Son manufacture flies and baits of every description upon the most approved principles. They hold the appointment of fishing-rod and tackle makers to Her Majesty the Queen.

[1115]

PILLINER, S. A., 4 *Hatfield Place, Blackfriars*.—Anatomized leaves.

[1116]

PLUMMER, STEPHEN, 84 *Church Road, Islington*.—Models of St. Paul's and Salisbury cathedrals.

[1117]

RAYNBIRD, HUGH, Land Agent, *Basingstoke*.—Specimens of timber, bark, hoops, &c., from Hampshire woods and coppices.

[1118]

RECKITT & Co., *Eureka Works, Hulme, Manchester*.—Patent American leather-cloth, and table baize.

[1119]

ROBERTSON, ALEXANDER, *Holloway Mills, London, N.*—Patent barrel-package of wood, improved substitute for tinned-iron canisters.

[1120]

ROUTLEDGE, T., *Eynsham Mills, Oxford*.—Esparto, or alfa, and half-stuff for paper manufacture.

[1121]

SCOTTISH VULCANITE COMPANY (Limited), *Edinburgh*.—Patent vulcanite (hard rubber and gutta-percha) combs, whalebone substitute, &c.



This company manufactures patent vulcanite combs, knife-handles, whalebone substitute, &c. This is a new and important manufacture of india-rubber and gutta percha, destined to be of permanent and almost universal adaptation. It at once supplants all the appliances of whalebone. Being infinitely more durable, and susceptible of a higher finish, it receives impressions as clear and sharp as the finest carved ivory, is capable of being worked out in an endless variety of elaborate designs, and has also the recommendation of great economy. This compound is fitted to take the place of the following substances, viz.: enamel, ivory, buckhorn, whalebone, &c.

It not only makes a good substitute for these material but is also in reality superior in quality, in some respects, to the natural substances. The hardest compound resembles marble, that which is less hard ivory and buckhorn, and that which is still softer buffalo-horn and whalebone. In general it possesses more durable properties than any of these, except marble, and is even more substantial in some respects; because in all degrees of hardness, it has a great degree of toughness or tenacity, and the property of retaining the shape into which it has been moulded and heated.

[1122]

SCOTT, WENTWORTH LASCELLES, *Westbourne Park, Bayswater, W.*—Specimens of cotton, in "fasciculæ," showing length of staple.

[1123]

SEITHEN, ANTON BRUNO, 1 *Wharf Road, City Road*.—New manufacture of corks, and apparatus for grinding corks in lieu of cutting.

[1124]

SHEPHERD, BRIGGS, & Co., *Portobello Mills, Wakefield*.—Cocoa-fibre and Manilla mats and mattings.

[1125]

SILVER, S. W., & Co., 66 and 67 *Cornhill*.—Articles in india-rubber and ebonite.

[1126]

SIMMONDS, PETER LUND, 8 *Winchester Street, Pimlico*.—Collection of nuts, seeds, fibres, &c., scientifically named, and their applications.

[1127]

SKILBECK, J., *Upper Thames Street*.—Woods and articles used in dyeing.

[1128]

SMEE, WILLIAM, & SONS, 6 *Finsbury Pavement, London*.—Specimens of woods used in the manufacture of household furniture.

[1129]

SMITH, THOMAS, & SONS, *Herstmonceux, Hurst Green, Sussex*.—Basket manufactures.

[1130]

SMITH, WILLIAM & ANDREW, *Mauchline, Ayrshire, and 61 Charlotte Street, Birmingham*.—Scottish fancy wood-work.

[1131]

SPILL, GEORGE, & Co., *Hackney Wick, E.C., and 149 Cheapside, London, E.C., and 9 High Street, Bristol*.—Vegetable leather; leather-cloths; waterproof fabrics; and machinery band manufacturers. (*See page 106.*)

[1132]

STEINITZ, CHARLES, *London Parquetry Works, Grove Lane, Camberwell, S.*—Collections of exotic furniture woods, and of diaphanic woods.

[1133]

STEVENS, M., *Royal Mews, Pimlico*.—Anatomized leaves.

[1134]

STEVENS, W., 14 *Great Russell Street, Bloomsbury*.—Wax figures and flowers.

[1135]

SWAAB, S. L., Oculist, 9 *Hunter Street, Brunswick Square*.—Prepared India fibres, flax, hemp, and fibres converted in silk and cotton.

[1136]

TAYLER, HARRY, & Co., 19 *Gutter Lane, Cheapside, London*; Works, *Deptford Green*.—Kamptulicon for floors, knife-boards, lunatics' cells, and horse-boxes. (*See page 107.*)

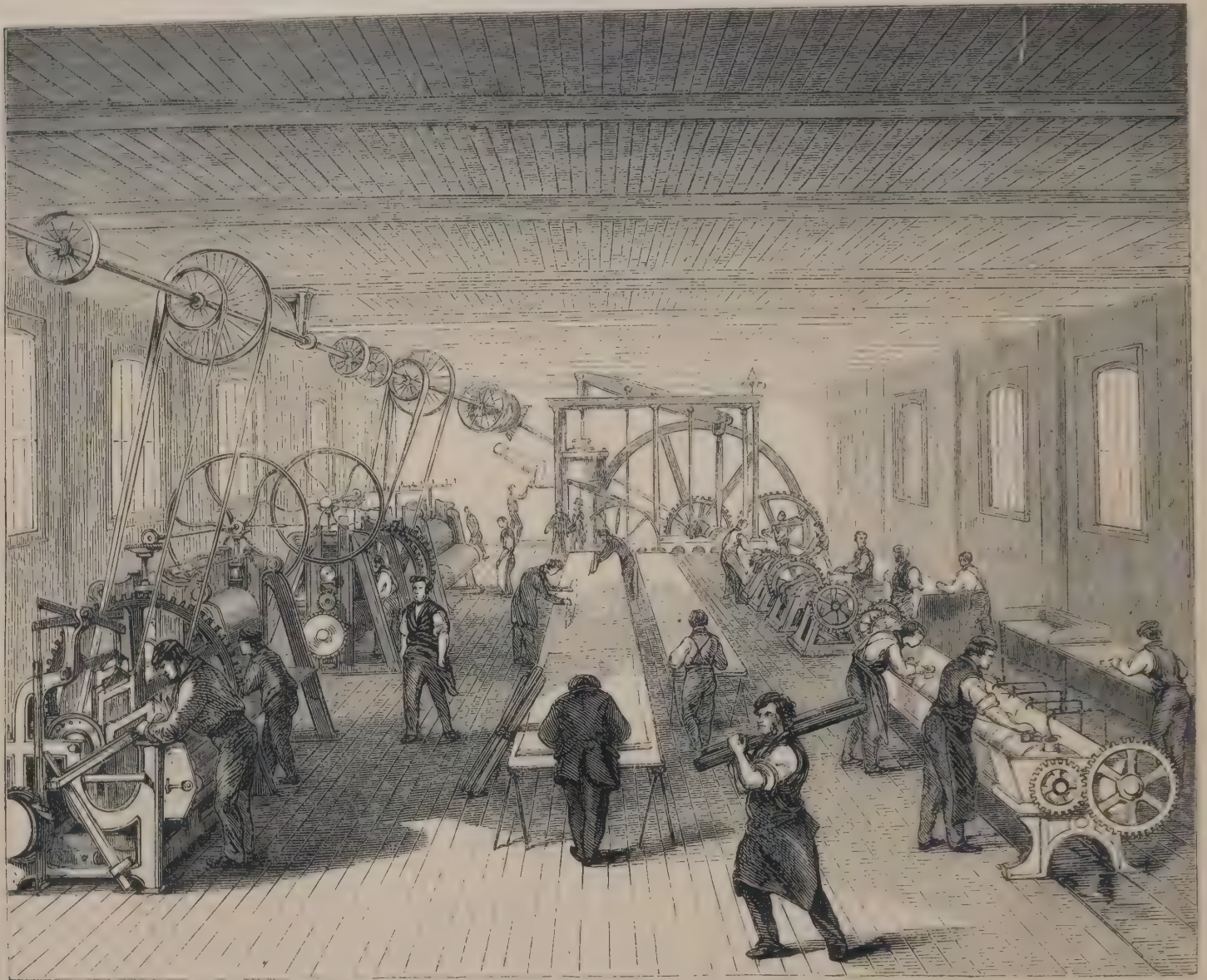
[1137]

TAYLOR, BENJAMIN, 169 *St. John Street Road*.—Vegetable ivory turnings.

[1138]

TOPLIS, T. & J., *Ashby-de-la-Zouch*.—Flower stands, work-baskets, &c.

SPILL, GEORGE, & Co., *Hackney Wick, N.E., and 149 Cheapside, London, E.C., and 9 High Street, Bristol.*—Vegetable leather; leather-cloths; waterproof fabrics; and machinery-band manufacturers.



INTERIOR VIEW OF WORKS. ONE OF THE MACHINERY ROOMS.

Nos. 1 to 10.—Spill's enamelled vegetable leather for carriage hoods, knee boot aprons, railway carriage cushions, antigropelos, gaiters, and military accoutrements, made of any colour or substance.

Nos. 11 to 20.—Morocco vegetable leather for carriage linings, furniture covering, children's and ladies' shoes, reticules, bags, office table-covers, &c. &c., made of any colour or substance.

No. 21.—India-rubber waterproof mineralized overcoat, or pocket siphonia, of superfine India cloth, weighing only six ounces, warranted to withstand any degree of heat under 400 Fahrenheit.

No. 22.—India-rubber mineralized overcoat, light-coloured surface for tropical climates, non-attractive of heat, and very durable.

No. 23.—Waterproof vegetable leather military cape, scarlet, made without sewing, and the material without weaving; very durable, and warranted suitable for any climate. It can be made to any other regimental uniform colour.

No. 24.—Enamelled vegetable leather antigropelos for riding, with side "steel spring" fastenings.

No. 25.—Enamelled vegetable leather gaiters for walking, with side "steel spring" fastenings.

No. 26.—Enamelled vegetable leather gaiters for riflemen, with knee-cap cushion for rifle practice, with side "steel spring" fastenings.

No. 27.—Enamelled and morocco vegetable leather buskins for walking (in colours), with side fastenings of buttons or steel springs.

No. 28.—Patent improved machinery belting, made to any length in one piece, and in any width up to twelve inches, warranted not to be affected by heat, grease, or water, will not stretch or slip on the pulleys, and is exceedingly strong, every inch in width of No. 1 quality will sustain a weight of 2000 lbs.

No. 29.—Patent improved machinery belting, No. 2 quality, every inch in width will sustain a weight of 3000 lbs.

No. 30.—Patent improved machinery belting, No. 3 quality, every inch in width will sustain a weight of 4000 lbs.

Manufacturers of improved vulcanized and mineralized india-rubber garments and piece goods, patent machinery bands, enamelled and morocco vegetable leather, and leather-cloth fabrics, waterproof oil clothing, sou'-westers, waggon and rick covers, and vegetable leather gaiters. Japanners and embossers.

TAYLER, HARRY, & Co., 19 *Gutter Lane, Cheapside, London*; Works, *Deptford Green*.—
Kamptulicon for floors, knife-boards, lunatics' cells, and horse-boxes.



PATTERN OF KAMPTULICON.

KAMPTULICON is a felted article composed of india-rubber, gutta-percha, and cork, and is applied to numerous purposes, such as covering floors, knife-boards, the cells of lunatics, horse-boxes, and for the packing of railway chairs, &c. For floors it is usually made plain and of a light-brown colour; but it may be coloured of any tint to suit the taste of customers, or ornamented with designs of Egyptian, Grecian, Etruscan, or mediæval character. The pattern is printed, leaving the original surface as much as possible exposed, by which it is rendered a medium warmth between carpet and oil-cloth. As a covering for knife-cleaners it possesses all the advantages of leather at about one-fourth of the cost. For lunatics' cells—the walls and floors being covered with kamptulicon, if from half an inch to one inch in thickness, the

resiliency of the material prevents the inmates doing themselves any personal injury, while, from its being a non-conductor of heat, it conduces to the maintenance of an equable temperature. It is already adopted by the governors of Bethlehem Hospital, and of some other asylums. It is of great service for lining the boxes or covering the backs of the stalls of kicking horses. By deadening the sounds of the blows, it has a great tendency to cure this vicious habit, while, by its elasticity, it prevents injury to the horse itself. It is used in the royal stables, and in those of many noblemen and gentlemen. It also makes an admirable floor for riding-schools; preventing noise, lessening the shocks in the falls of riders, and saving the horses' feet the concussion of hard pavement.

[1139]

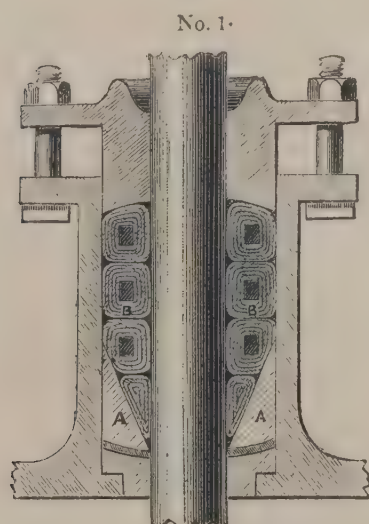
TRELOAR, THOMAS, 42 *Ludgate Hill, London*.—Mats, matting, rugs, brushes, hassocks, &c., of cocoa-nut fibre. (See page 109.)

[1140]

TRESTRAIL, F. G., & Co., 19 & 20 *Wallbrook*.—Kamptulicon, or india-rubber and cork floor-cloth. (See page 110.)

[1141]

TUCK, J. H., & Co., 35 *Cannon Street, London, E. C.*—Patent elastic packing and rubber manufactures, for steam-engines and other mechanical purposes.



No. 1.

Before the introduction of this packing, hemp, plaited or otherwise, was the material most commonly employed in the stuffing-boxes of steam-engines, &c. This plaited hemp requires frequent removal, otherwise it becomes hard, injuring the rod or moving surface, and even when an excessive quantity of tallow or oil is used for lubrication it is extremely difficult to maintain a good vacuum. To meet these very serious objections the elastic core packing was invented. It consists of a roll of properly prepared canvas, having an elastic core or centre; this roll is cut and bent into rings, as shown in Diagram No. 2. The packing thus made when used in connection with



No. 2.

the metallic cone or lining fitted into the bottom of the stuffing-box (the object of which is to bring the packing directly against the rod or rubbing surface), produces a better vacuum, reduces the friction, effects a great saving in oil and tallow, does not become hard, nor does it require drawing, but is gradually worn away.

Diagram No. 1 is a section of a stuffing-box packed with the patent packing A, and having a lining B inserted in the bottom.

Diagram No. 2 shows the patent packing and lining ready to be placed in the box.

[1142]

TURNBULL, T., *William Street, Portland Town, St. John's Wood*.—Specimens of wood sawn by an improved method.

[1143]

WALDEN, SAMUEL J., *Whitefriars, E.C., and Walham Green, Fulham, S.W.*—A variety of articles in wicker-work; baskets, tables, and chairs.

[1144]

WALKER & STEMBRIDGE, *Ducksfoot Lane, London*.—Gums and gum-resins of every description for manufacturing purposes.

Having devoted their attention for many years past exclusively to gums and gum resins, the exhibitors are prepared to supply (wholesale only) every description used in the arts and manufactures on the best market terms.

Shellac.	Copal.
Sticklac.	Damar.
Seedlac.	Arabic.
Animi.	Senegal.

Tragacanth.	Mastic.
Sandrac.	Benzoin, &c. &c.
Agents.—Manchester: Mr. Underwood, 20, Greenwood Street.	
Paris: Mr. James Watt, 15 Rue de l'Exchange.	
Hamburg: Messrs. Steffensen & Co., 46 Brauer Strasse.	

[1145]

WANSBOROUGH, JAMES, *Grove, Guildford Street, Southwark*.—Waterproof flocked cloth, and hard and soft india-rubber goods.

[1146]

WARNE, WILLIAM, & Co., 9 *Gresham Street West, London, E.C., and Tottenham*.—Manufactures of india-rubber.

TRELOAR, THOMAS, 42 *Ludgate Hill, London*.—Mats, matting, rugs, brushes, hassocks, &c. of cocoa-nut fibre.

[*Obtained Prize Medals—London, 1851 ; New York, 1853 ; Paris, 1855 ; Brussels, 1856.*]

1. Matting, plain and with figured borders, for covering halls, passages, waiting-rooms, offices, aisles of churches, and public buildings. It possesses extraordinary durability, and is not affected by damp or wet.

2. Mats and rugs for doorways, railway carriages, &c., plain and with figured worsted borders.

3. Mats and rugs in ornamental borders.

4. Pompeian mats, "Salve," and "Cave Canem."

5. Hassocks and kneelers for church use.

6. Brushes for household and stable use.

7. Mattresses filled with prepared cocoa-nut fibre, as a substitute for horse-hair.



DOOR MAT.



DOOR MATS.

TRESTRAIL, F. G., & Co., 19 & 20 Walbrook.—Kamptulicon, or india-rubber and cork floor-cloth.



PATTERN OF KAMPTULICON.

Thick, plain	5s.	} Per square yard.
Ditto, printed	...	...	...	...	...	...	...	...	...	5s. 6d. to 5s. 9d.
Thin, plain	...	...	...	...	...	...	...	...	...	4s.
Ditto, printed	...	...	...	...	...	...	...	...	...	4s. 6d. „ 4s. 9d.

F. G. Trestrail & Co.'s Patent Coloured Kamptulicon, manufactured with F. Walton's patent india-rubber substitute, is impervious to wet, indestructible by damp or heat; soft, noiseless, and warm to the feet. It is far superior to any other material ever invented for the covering of floors, and is especially adapted for the aisles of churches, halls, public offices, railway stations, libraries, smoking, billiard, and bath rooms, &c., &c. It is made plain, coloured, or figured in imitation of carpets, mosaics, or other pavements; and also in a variety of different patterns expressly designed for the material.

This Kamptulicon differs from all others in this important particular, that it is coloured right through, and therefore instead of having the appearance which the ordinary material has when worn, it will, with occasional washing, preserve its colour to the last.

Warehouses—19 & 20 Walbrook, E.C. Manufactories—South London Works, Lambeth, and Chiswick.

[1147]

WELLS & HALL, 60 *Aldermanbury*.—Elastic braids and fabrics.

Messrs. Wells and Hall's patent vulcanized india-rubber cords, braids, and webs, are made from Charles Macintosh & Co.'s super thread, which is durable, and also permanently elastic.

[1148]

WEST HAM GUTTA-PERCHA COMPANY, 18 *West Street, Smithfield*.—Gutta-percha; gutta-rubber; telegraph wire.

[1149]

WHITEHEAD, THOMAS, 37 *Eastcheap, London*.—Straw envelopes for packing glass bottles.

[1150]

WILDEY & CO., 7 *Holland Street, Blackfriars Road, London*.—Mats, matting, &c., of cocoa-nut fibre.

[*Obtained Prize Medals—London, 1851; New York, 1853; and Paris, 1855.*]

The following preparations of the fibre of the outer husk of the cocoa-nut, and articles manufactured from the same are exhibited:—

1. In a curled state, to be used as stuffing for mattresses, chairs, sofas, carriages, &c., substitute for horse-hair, wool, and other substances. Its peculiar qualities are durability, cleanliness, cheapness, and salubrity.

2. In a drawn state, to be used as a substitute for bristles in making brushes and brooms, both for household and stable purposes.

3. Fibre prepared for spinning.

4. Yarns and cordage spun from fibre by machinery in this country, and also by the Cingalese.

5. Floor-mattings, woven by hand and power-loom, as supplied to Her Majesty's Office of Works, for Palaces, Public Buildings, and Government Offices.

6. Plain and ornamental door and other mats.

7. Netting for sheep-folds.

8. Thatching cord.

9. Nosebags for horses.

10. Cider cloths.

11. Mats for oil pressing.

[1151]

WILSON, A. & G., 19 *Waterloo Place, Edinburgh*.—Variety of fishing-tackle, consisting of rods, reels, lines, gutwork, and flies.

[1152]

WRIGHT, C., 376 *Strand, W. C.*—Fishing-rod, tackle, and archery.

[1153]

WRIGHT, J., *Kelso, Scotland*.—Artificial flies and casting lines.



SUB-CLASS D.—*Perfumery.*

[1163]

ATKINSON, JAMES & EDWARD, 24 *Old Bond Street*.—Perfumery and articles for the toilet.

[1164]

BAYLEY & CO., 17 *Cockspur Street*.—Perfumed essences, oils, distilled waters, pomades, creams, and toilet soaps. (*See page 112.*)

[1165]

BENBOW & SON, 12 *Little Britain, E.C.*—Perfumery and toilet articles.

BAYLEY & Co., 17 Cockspur Street.—Perfumed essences, oils, distilled waters, pomades, creams, and toilet soaps.



Bayley & Co., perfumers to the Royal Family and foreign Courts, manufacture the following articles, samples of which are exhibited :—

ESS. BOUQUET.

From this perfume becoming the peculiar favourite of his Majesty George IV., arose many imperfect imitations of the article, which continue to be sold under the name of Bouquet du Roi, Esprit de Bouquet of George the Fourth, &c., but the ESSENCE BOUQUET, exclusively prepared by Bayley & Co., Cockspur Street, London, is the only article entitled to those appellations, and which possesses an unrivalled and distinct fragrance. This perfume has become a favourite in many foreign courts and cities.

Bayley & Co. make "the Ess." of one quality and one price only. The following perfumes are also of their peculiar preparation :—

BOUQUET DE LA REINE VICTORIA.

Jockey Club Bouquet.	Almond Blossoms
Bridal "	Esprit Victoria
Army & Navy "	" Albert
Balmoral "	" Unis
Wellington "	" du Château
Cavalry "	" Magnolia
Court "	" de Fleurs
Prince of Wales "	" Oriental
Windsor "	" Verveine
Esterhazy "	" Vetivert
Kensington "	" Muguet
Princess Alice "	" Réséda
Princess Royal "	" Jasmin
Empress "	" de Tubereuse
L'Empereur "	" Fleur d'Orange
Sweet Briar "	" Mousseline
New Mown Hay "	" Violette Double
Cuir de Russie "	Esprit de Rose
Spring Flowers	White Rose
Forest Flowers	Provence Rose
Summer Blossoms	Essence de Rose Mosseuse

Essence of Maréchale
 " of Geranium
 Essence Frangipane
 " Souveraine

Double Essence of the
 Wood Violet
 Extrait Chypre

Extrait de Patchouli
 Eau de Portugal
 " Miel
 " d'Hongrie de Montpellier
 Eau Suave

Eau à Brûler
 Bois de Santale
 Lavender water, pts., $\frac{1}{2}$ pts.,
 $\frac{1}{4}$ pts.
 Honey water

Otta of rose soap tablets
 Spermaceti " "
 Ess. Bouquet " "
 Almond " "
 Violet " "
 Orange Flower " "
 Winter " "
 Indian " "

Rose soap tablets.
 A l'Ambre Musque soap
 tablets.
 Glycerine soap tablets.
 Brown Windsor "
 White " "
 Palm "

Spermaceti shavingtablets
 " " paste
 Hanover shaving paste.
 Italian cream.

Windsor soap, white
 " " brown, highly perfumed
 " " Sims's old

Hemet's Essence of Pearl for the teeth and gums.
 " Pearl Dentrifrice " "

Cold cream, in pots
 Pomade Divine, for bruises, &c.
 Honey paste

PREPARATIONS FOR THE HAIR.

Aroma al Cariense	White rose.
Marrow pomade oil	Oriental
Wood violet	Bears' grease.

[1166]

BONUS, WILLIAM E., 9 *Charles Street, Manchester Square*.—Fruit essences; ancient and modern hair dyes; cantharidine.

[1167]

BREIDENBACH, F. H., 157B *New Bond Street*.—Perfumery.

[1168]

CLEAVER, F. S., 32 & 33 *Red Lion Street, Holborn, W.C.*—Fancy soap and perfumery.

[1169]

CONDY, BROTHERS, & Co., 15 *Garlick Hill, London*.—Essential oils and extracts; artificial flavourings and fruit essences.

[1170]

DELCROIX & SON, 39 *Great Castle Street, Regent Street, London*.—Perfumes, pomades, oils, cosmetics, sachets, and Eau-de-Cologne.

[1171]

EDE, R. B., & Co., 21 *Bow Lane, London, E.C.*—Perfumery and domestic requisites.

[1172]

EWEN, JAMES, 17 *Garlick Hill, London*.—Clarified fats for chemical, culinary, and perfumery purposes.

[1173]

GOSNELL, JOHN, & Co., 12 *Three King Court, Lombard Street*.—Perfumery and soaps; hair brushes and other kinds of brushes.

[1174]

HIRST, BROOKE, & TOMLINSON, *Leeds*.—Perfumed toilet soaps and perfumery.

[1175]

KEITH, GEORGE, 55 *Great Russell Street, Bloomsbury*.—British perfumery and freezing-powders for hot climates.

[1176]

LANGDALE, EDWARD FREDERICK, Distiller of Essential Oils, 72 *Hatton Garden*.—A collection of oils.

[1177]

LEWIS, JAMES, 6 *Bartlett's Buildings*.—Perfumes extracted by cold process; toilet and iodine soaps; marrow oil.

[1178]

LLOYD, W. A., 19 *Portland Road, Regent's Park*.—Aquarium.

[1179]

LOW, ROBERT, SON, & HAYDON, 330 *Strand*.—Fancy soaps, perfumery, ivory and inlaid hair-brushes; tortoiseshell, india-rubber, and ivory combs. (*See page 114.*)

[1180]

MOREAU, T., 88 *Regent Street*.—Rouge Végétal, Blanc de perles, Crème de l'Impératrice, Parfumerie en général. Wholesale and Retail.

The following are exhibited :—

Moreau's Crème de l'Impératrice renders the skin beautifully white, soft, and transparent. It removes sunburns, freckles, and other discolorations of the skin.

Ladies' Oriental Book of Beauty. A new discovery just registered for the Exhibition.

Bouquet International, a perfume for the handkerchief.

Rouge Végétal and Chinese leaf are beautiful and natural in colour, and harmless in their effects. Blanc Liquide for the arms and neck, gives a soft and velvet-

like appearance resembling the bloom of youth. Blanc de Perle in powder, Poudre de Riz, and Noir de Ristori (which gives a brilliant lustre to the eyes).

Since 1781 Moreau has been the fournisseur of all the courts of Europe.

Every requisite for the toilet, may be procured at T. Moreau's, de Paris, Perfumer, 88 Regent Street, London. Established in Paris 1781.

Madame Moreau attends ladies either at her establishment or at their own residences.

LOW, ROBERT, SON, & HAYDON, 330 Strand.—Fancy soaps, perfumery, ivory and inlaid hair-brushes; tortoiseshell, india-rubber, and ivory combs.



Robert Low, Son, and Haydon are manufacturers of the choicest articles of perfumery, fancy soaps, hair-brushes, &c., some of which they here enumerate.

Low's highly perfumed brown Windsor soap obtains decided preference over all others in every part of the world.

Low's celebrated honey, glycerine, olive-oil, and other fancy soaps.

Low & Co. have always in stock a large assortment of hair-brushes in ivory, wood, and bone; also combs in tortoiseshell, buffalo horn, and india-rubber. Tooth and nail brushes of superior manufacture. The hair of these brushes is warranted not to come out.

Low's vanilla tooth-paste, a most valuable article for cleansing the teeth and gums, and sweetening the breath.

Low's Syrian liquid hair dye, instantaneous, permanent, and easy of application.

Low's cold cream for healing chapped skin at all seasons.

Low's celebrated well-established perfumes.

Jockey club.

Frangipanni.

Ess. bouquet.

Queen of Alps.

Empress.

Wood violet.

Fragrant.

New-mown hay.

Also new perfumes for the present year: World's fair, and Victory bouquet.

Low's celebrated preparations for the hair.

Manufactory: 330 Strand (opposite Somerset House), London.

[1181]

PEARS, A. & F., Inventors and Manufacturers, 91 *Great Russell Street, Bloomsbury, London*.—Genuine transparent soap.

This soap undergoes a process by which all the superfluous alkali is entirely removed. Its colour is acquired by age, its perfume has also been studied so as to make it most agreeable. It is made in square cakes, oval tablets, and balls for washing; and in round cakes and sticks for shaving.

Pears's Transparent Shaving Stick saves time and trouble to the shaver, and also renders the process of shaving more

easy and cleanly than the old mode of using the shaving-dish.

Their case contains pieces of transparent soap manufactured by them 35, 20, 10, 5, and 3 years ago.

"The jury have tried transparent soap 25 years old, manufactured by A. & F. Pears, of which A. Pears was the inventor, and found it very good."—See Jurors' Report of the Great Exhibition of the Industry of all Nations, 1851.

[1182]

PERKS, SAMUEL, *Hitchin, Herts.*—Essential oil of lavender, &c.

[1183]

PHILLIPSON & Co., *Budge Row, Watling Street, St. Paul's*.—Fancy soaps; perfumery; brushes; combs; toilet preparations.

[1184]

PIESSE & LUBIN, 2 *New Bond Street*.—Sweet scents from flowers, and other perfumery. (See page 116.)

[1185]

PRICE, NAPOLEON, & JOHN LYON, 158 *New Bond Street*, and 3 *George Yard, Lombard Street*.—Choice perfumery, fancy and transparent soaps, and golden oil.

[1186]

RICHARDSON, J., 30 *Bishopsgate Street Without*.—Fancy soaps and perfumery.

[1187]

RIMMEL, EUGENE, Manufacturing Perfumer, 96 *Strand, London*.—Perfumery, perfumery materials, toilet soaps, and perfume vaporizer. (See pages 118 & 119.)

[1188]

ROBSON, J. M., 32 *Lawrence Lane, Cheapside*.—Fancy soaps and perfumery.

J. M. Robson imports the various essential oils and French extracts used in perfumery, and manufactures perfumes, fancy soaps, &c. He is the sole proprietor of the celebrated "Kalosgensis" sauce, and the inventor of the renowned "Rose of England" soap. He also keeps

a stock of combs, brushes, and all other articles required for toilet use, of which price lists may be obtained by application. Sample cases from 10*l.* upwards, suitable for any part of the globe, are supplied on the shortest notice.

[1189]

SAUNDERS, JAMES TOUZEAU, 148 *Oxford Street*.—Specimens of various articles of perfumery, including several novel products. (See page 117.)

[1190]

THOMPSON, J., 6 *King Street, Holborn, W.C.*—Toilet soaps and distilled perfumes.

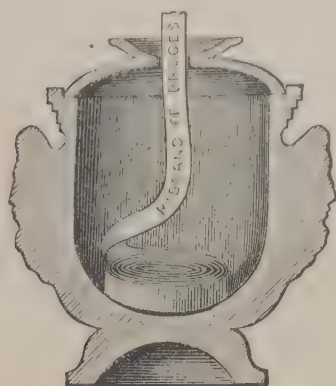
[1191]

VICKERS, SHORT, 12 & 13 *Boat Lane, Leeds, Yorkshire*—Perfumes, pomades, general perfumery, &c.

Perfumery, fancy soaps, sponges, and every other toilet requisite may be obtained, wholesale and retail, from

S. Vickers, at the "Acme of Fashion," established in the year 1804.

PIESSE & LUBIN, 2 New Bond Street, London.—Sweet scents from flowers, and other perfumery.



Section of Vase.



MESSRS. PIESSE & LUBIN are the inventors of several novelties for toilet use; manufacturers of perfumery; flower-farmers; distillers of the odours of plants, and importers of musk, ambergris, civet, and otto of roses. The following is a condensed list of their manufactures and preparations.

CONCENTRATED ESSENCES OF FLOWERS—Primitive Odours for perfuming the Handkerchief.

Magnolia	Wood Violet	Orange Blossom	Australian Wattle	Civet
White Rose	Volkameria	Orange of Portugal	Clematis	Ambergris
Cedrat	Limette	Sweet Pea	Wallflower	Lotus of Egypt
Sweet Daphne	Musk	Tuberose	Southernwood	Hoya-Bella
Sweet Briar	Mitcham Lavender	Clove Pink	Reseda	Kus-Kus, or Vitivert
Winter Green	Geranium	Acacia	Provence Rose	Patchouly
Neroly	Cedar Wood	Heliotrope	Mignonette	Water Lily
Bergamot	Forget-me-not	Lemon	Tea Rose	Fragrant Phlox
Meadow Queen	Moss Rose	Ambergris	Santal Wood	Narcissus
Hyacinth	Jonquil	Jessamine	White Lilac	Erica Odorata
Spring Violet	Lily of the Valley	Verbena Leaf	Syringa	Allamandra
Citronella	Lemon Thyme	Honeysuckle	Citron	Chypre

Sold in bottles, 2s. 6d., 5s., 10s., 20s., and 40s. each.

BOUQUETS AND NOSEGAYS—Mixed Odours for Scenting the Handkerchief.

Frangipanni, an Eternal Perfume	Baroness Rothschild's Bouquet	Albion Nosegay.
Piesse's Posy	The Cottage Flower	Royal Horticultural Garden Bouquet
Odoratissima	Wild Flowers	Jolly Dog
New Bond Street Nosegay	Box-his-Ears (sequel to Stolen Kisses)	Young Lubin
Bouquet Millefleurs	Rondeletia	Something New!
Her Majesty's Perfume	H.R.H. Prince of Wales' Perfume	Bouquet of all Nations
Empress Eugénie's Nosegay	(Smallest bottle of this essence is 20s.)	St. Valentine's Nosegay
Bouquet du Napoléon III.	The Flower of the Day	Mousseline
Royal Hunt Bouquet	Early Spring Flowers	Bosphorus Bouquet from the Valley
Jockey Club Perfume	The Thorny Rose	of Sweet Waters
Yacht Club Nosegay	Marechale	Buckingham Palace Perfume
Stolen Kisses—for 1861	Neptune, or the Naval Nosegay	Curious Essence
Zouave, this Nosegay contains "all	Flowers of Erin	Chinese Bouquet
the Perfumes of Arabia"	Kiss-me-Quick	Our Village Nosegay
Ess. Bouquet	Flowers of Scotland	Fleur de Mauve
Prince Arthur's Choice	Perfume of Paradise	

Sold in bottles, 2s. 6d., 5s., 10s., 20s., and 40s. each.

Purchasers taking an assortment of half a dozen will be charged at a reduced price. New perfumes every year.

The Sportsman's perfumes, three bottles in a box, 7s., consisting of Royal Hunt, the Tally Ho! and Yacht Club Bouquet. The Wedding perfumes, three bottles in a box, 7s., or three boxes, 20s., containing Orange Blossoms, Lily, and Violet. Scented Shells, from the Maldiv Islands, 2s. 6d. per doz. Satchel Powders of dried flowers.

THE FOUNTAIN FINGER RING. Registered August 1st, 1860. The delight of all who have seen this little conceit is most gratifying to its inventor. It is at once useful and ornamental. By the least pressure, the wearer of the ring can cause a jet of perfume to arise from it at any time desired—thus every one can carry with them to a ball, concert, or public assembly, enough scent for the evening.

The rings can be filled with perfume with the greatest ease—thus: press the ball at the back of the ring nearly flat, pour scent into a cup, and dip the ring into it; the elasticity of the ball will then draw the perfume into the interior till full. Each ring will hold about half an ounce of the perfume.

Visitors to the sick will find a ring filled with Hungary Water, the antiseptic qualities of which are so valuable, to be of the greatest service, both to invalid and visitor.

RIBBON OF BRUGES, FOR FUMIGATION. — Draw out a piece of the ribbon, light it, blow out the flame, and as it smoulders a fragrant vapour will rise into the air. [Entered at Stationers' Hall.]

SCENTED GEMS.—Curiosity is excited to know how these gems are capable of yielding fragrance like a natural flower, and from what country they come. As they are moved about in the *petite boîte* which contains them, they exhibit the beauty of the kaleidoscope, and exhale the most delightful odour.

Catalogues post free to all applicants.

Works by SEPTIMUS PIESSE, Analytical Chemist:—

1. "The Art of Perfumery, with the methods of obtaining the odours of plants." Crown 8vo, 60 wood engravings (third edition), 10s. 6d.

2. "Chemical, Natural, and Physical Magic." Crown 8vo, 30 wood engravings, 3s. 6d.

3. "The Laboratory of Chemical Wonders." Crown 8vo, illustrated, 5s. 6d.

Longman, Green, & Co., Paternoster Row; and of the Author, 2 New Bond Street, London.

Shippers and exporters are treated upon unusually liberal terms.

For shipping discounts—see export price list.

SAUNDERS, JAMES TOUZEAU, 148 *Oxford Street*.—Specimens of various articles of perfumery, including several novel products.



SAUNDERS'S FACE POWDER, OR BLOOM OF NINON, is a most delicate preparation for beautifying the complexion, free from anything which can injure the skin.

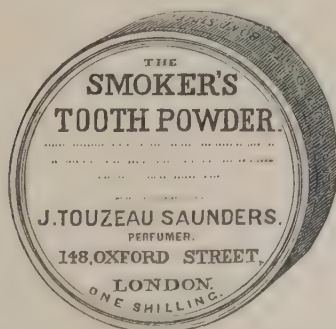


The FACE POWDER has a delicate roseate hue, and is preferable to all other preparations for preserving and clearing the complexion.

In the East Indies and other tropical countries it has been found of immense advantage in preserving the beauty of the complexion from the influence of climate.

Packets 6d. and 1s., free for 8 or 16 stamps.

Boxes 2s. 6d., free for 40 stamps.



THE SMOKERS' TOOTH POWDER has been in use some years, and gives unqualified satisfaction; it prevents the discoloration of the teeth from smoking, and imparts fragrance to the breath.

Price 1s. per box.

SAUNDERS'S GUARDS' HAIR DYE, instantaneous in action, moderate in price, perfectly harmless to the hair or skin, and dyes a good black or brown.

Prices 2s. 6d., 3s. 6d., 5s., 10s.

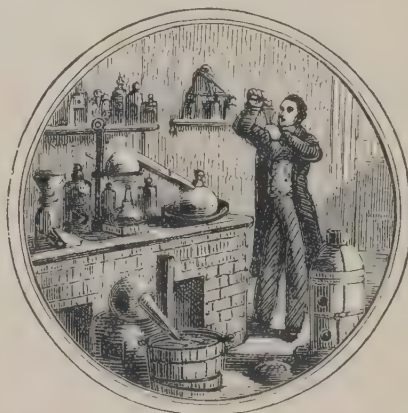
SAUNDERS'S QUILLAIA BARK HAIR WASH, a natural saponaceous wash, prepared from the bark of a tree (*Quillaia Saponaria*) found in South America.

This wash is useful as an astringent in case of weak hair, cleansing the skin of the head in a most surprising manner without the evil effect of soap on the hair.

Price 2s. 6d. and 4s. 6d.

SAUNDERS'S FLORAL PERFUMES are prepared with great care from every scent-giving plant or flower. Each perfume leaves upon the handkerchief a lasting odour of the flower from which it is distilled in all its freshness.

FASHIONABLE BOUQUETS.—Jockey Club, Frangipanni, Gerards' Bouquet, Prince of Wales, and every new favourite perfumes. Price from 2s.



SAUNDERS'S ENGLISH LAVENDER WATER, pure without the admixture of any other perfume, distilled from the finest Mitcham lavender flowers. Price 1s. 6d. to 7s.

SAUNDERS'S SHILLING PERFUMES, in great variety of perfumes, and of excellent quality.



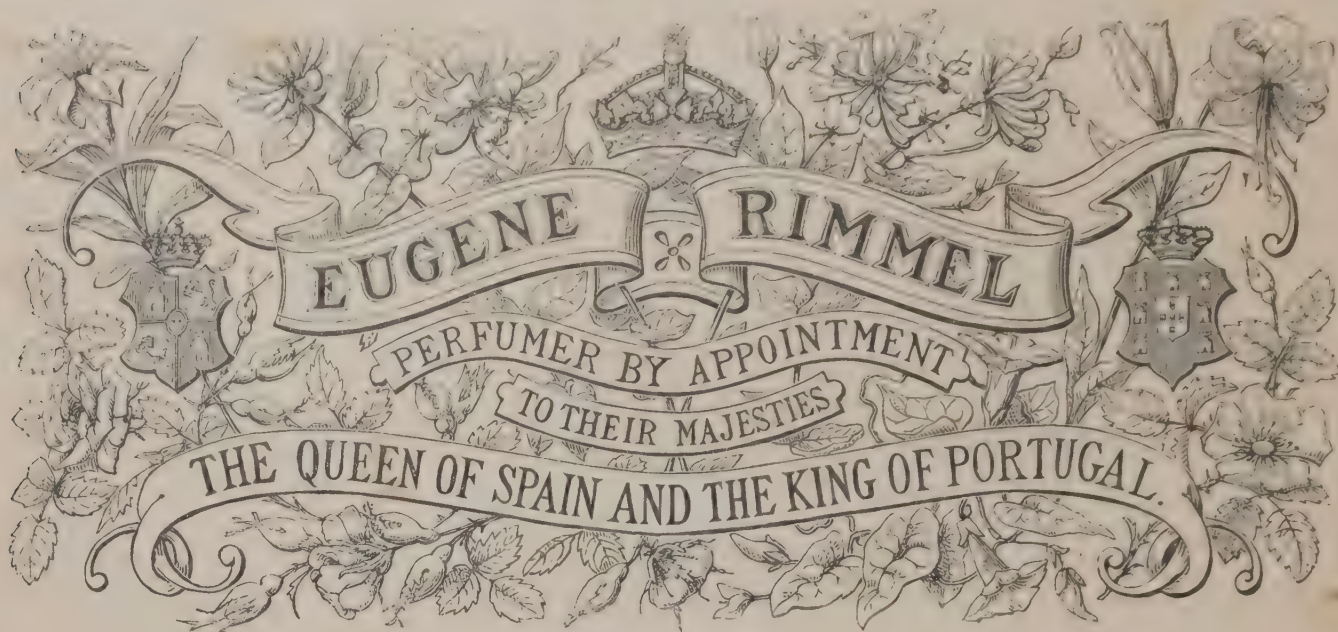
SAUNDERS'S MEDICATED SOAPS, intended to be used under medical direction, supply a convenient and novel means of diffusing such medicaments as are usually prescribed for the external treatment of skin diseases.

The substances included in the various soaps are combined in due medical proportion with pure olive-oil soap, and form bland and agreeable preparations suited to the several cases in which they may be prescribed.

A list of soaps forwarded on application.

SAUNDERS'S CHEW STICK DENTIFRICE, prepared from the branches of a climbing shrub (*Gouania Dominicensis*) common in Jamaica and other West India Islands.

An eminent botanist thus describes it: "In powder it forms an excellent dentifrice; its aromatic bitter producing a healthy state of the gums; the mucilage it contains working up by the tooth-brush into a soap-like froth." Price 2s.



LEFT-HAND CASE.

TOILET SOAPS.		s.	d.
Pure Glycerine Soap	per cake	0	6
The Queen's Soap, Russian, Spanish, and other fancy Soaps	per cake	1	0
Honey, Mallow Flower, Aromatic Herbs, Windsor, Honeysuckle, and various other Toilet Soaps, in 1 lb. bars and in packets		1s. and	1 6

SHAVING SOAPS.		s.	d.
Cream of Almonds, Ambrosial Cream, Rose, and Pistachio Cream		1s. and	1 6
The Officers' Shaving Soap, in metal tubes ..		1	0
Honey and Glycerine Shaving Soaps		0	6
Malaktikon, or Emollient Shaving Soap		1	0

RIMMEL's Distilled Violet Water, a new preparation for the toilet, is exhibited in a fountain designed by E. Rimmel and executed by Poitevin, illustrating the art



of distillation. The public will thus be enabled to test and appreciate the delicious and refreshing fragrance of this article, which is sold in elegant Parian bottles at 3s. 6d.

CENTRE CASE.—FOUNTAIN OF RIMMEL'S DISTILLED VIOLET WATER.

RIGHT-HAND CASE.—PERFUMERY.

Rimmel's Magic Vines, and other Fruit Trees, containing scent; price from 7s. 6d.

Rimmel's Floral Trees and Bouquets; each flower exhales its natural fragrance; price from 5s.

Rimmel's New Perfumes, the Exhibition Bouquet, Victoria Bouquet, Prince of Wales Bouquet, Jockey-club, Wood Violet, Ess Bouquet, Solferino, Magenta, African Flowers, Rimmel's Bouquet, &c.; price from 2s. 6d.

Kwei-hwa, a Chinese Perfume, in a silk box, 3s. 6d.

Rimmel's Toilet Vinegar, Extract of Lavender Flowers, Verbena Water, and Eau de Cologne; price from 1s.

Glycerine Cold Cream 1s. 0d.

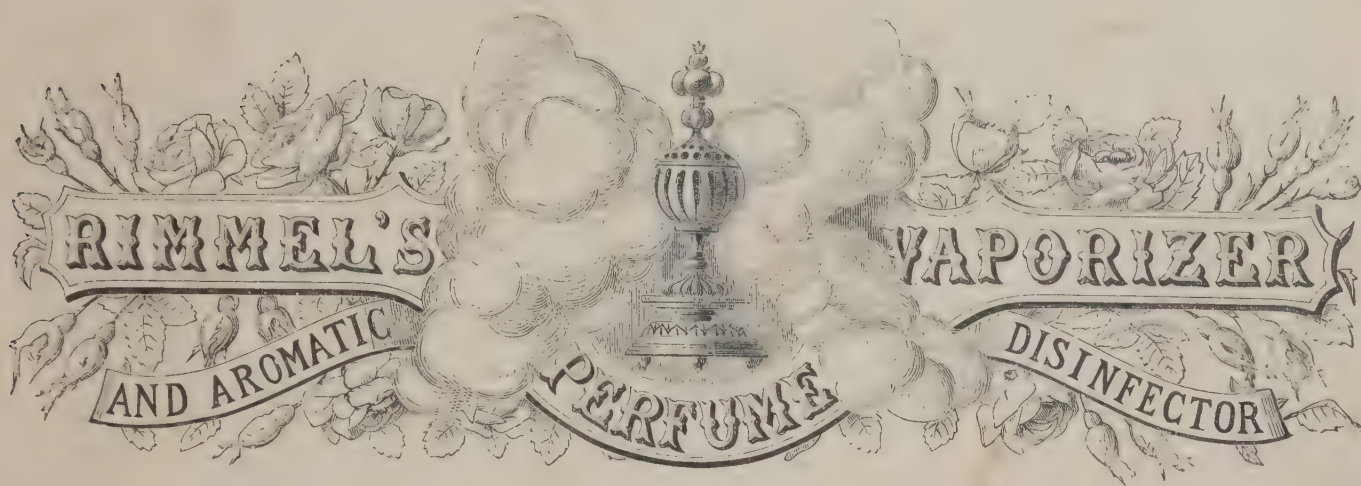
Glycerine Paste for the hands 1 6

Rose-leaf Powder, for the toilet 1 0

Rimmel's Lotion, for the complexion 2 9

The Queen's Pommade, in stoppered bottles ..	1s. 0d.
Glycerine Pommade	1 0
Parisian Cream, in glass vases with plated tops	2 6
Marrow Oil, in glass boxes with wooden tops ..	2 6
Nutritive Cream, in cut glass bottles ..	5 0
Brillantine, for imparting gloss to the beard, &c.	3 6
Glycerine and Egg Wash	3 6
Detersive Pommade	2 6
Indelible cosmetiques	1 6
Royal Dentifrice	1 0
Coral Tooth Paste	1 0
Elixir for the teeth	2 6
Perfumed Almanacs	0 6
Illustrated Sachets	6d. and 1 0
Benzoline for removing spots	1 0

A perfumery museum, showing the principal apparatus and materials used in its manufacture, with their technical names and places of production, is exhibited by E. Rimmel in a separate glass case, at a short distance from his stand. Descriptive Catalogues to be had on application.



RIMMEL'S PERFUME VAPORIZER is a newly-invented apparatus for diffusing the fragrance of flowers, and purifying the atmosphere in apartments, ball-rooms, theatres, &c. The various points of superiority it offers on pastilles, papers, ribbons, and other means in use hitherto may be thus briefly summed up.

I. It diffuses the perfume of any flower in all its freshness and purity.

II. The vapours produced are so delicate and refreshing that they cannot affect even the most nervous persons, and their elasticity is such that they spread over a vast area in a very short time.

III. This process entirely neutralizes the vitiated air generated in theatres, ball-rooms, and other assemblies. It also completely removes the smell of tobacco.

IV. It effectually purifies the air in dwelling-houses, and counteracts unpleasant and noxious effluvia arising from drains, gas, or any other cause.

V. It is invaluable for the sick chamber, substituting balmy and soothing vapours for a close atmosphere.

VI. It is strongly recommended to travellers, and will

also be found very reviving at sea to fumigate close cabins, and alleviate the sufferings of sea-sickness, by producing a pleasant atmosphere.

VII. The perfumes used in this process possessing a watery basis are not liable to ignition.

VIII. This apparatus forms an elegant drawing-room ornament, and is sold at a very moderate price, which places it within the reach of all classes.

IX. It has been submitted to Dr. Letheby, Dr. Hassall, and other eminent authorities, who have all expressed the highest opinion of its merits in a sanitary point of view. It has also been very favourably noticed by the *Times*, *Morning Post*, *Star*, *Telegraph*, *Herald*, *Standard*, *Builder*, *Atlas*, *Technologist*. Extracts from these and other papers will be found in a more detailed prospectus.

X. It has been used on board of her Majesty's steam yacht, at the Lord Mayor's banquet, at her Majesty's Theatre, Covent Garden, Drury Lane, Princess's, Lyceum, Hanover Square Rooms, and other public and private entertainments, where it has always given the greatest satisfaction.

PRICES OF THE VAPORIZERS.

	£	s.
No. 1. Bronze	0	6
No. 1. Plated	0	12
No. 2. Bronze	0	16
No. 2. Plated	1	4
No. 3. Bronze	1	0
No. 3. Plated	1	12
No. 4. Bronze	1	12
No. 4. Plated	2	8
Elegant china, from . .	1	1
Fancy patterns, from . .	0	15

Marine Vaporizers with safety-lamps, as used on board of the Peninsular and Oriental Company's boats, £1 10s.

PERFUMES TO BE USED IN THE VAPORIZERS.

Ordinary compounds from 2s. 6d.
Best compounds from 3s. 6d.



The vaporizer can only be used with the compounds prepared specially for the purpose by E. Rimmel, as other perfumes would not produce the desired effect, and might cause accidents.

RIMMEL'S AROMATIC DISINFECTOR is a cheaper apparatus, working on the same principle as the vaporizer, but chiefly used for sanitary purposes. It has been adopted by the Royal College of Surgeons and the principal hospi-

tals, and will be found exhibited in Class XVII. The price of it is 2s. 6d., including a bottle of aromatic disinfecting compound.

[1192]

WARRICK BROTHERS, *Garlick Hill, London, and Rue Fodéré, Nice.*—Essential oils, perfumes, pomades, &c.

[1193]

WHARRY, JAMES, *Chippenham, Wilts.*—Treble-distilled lavender water.

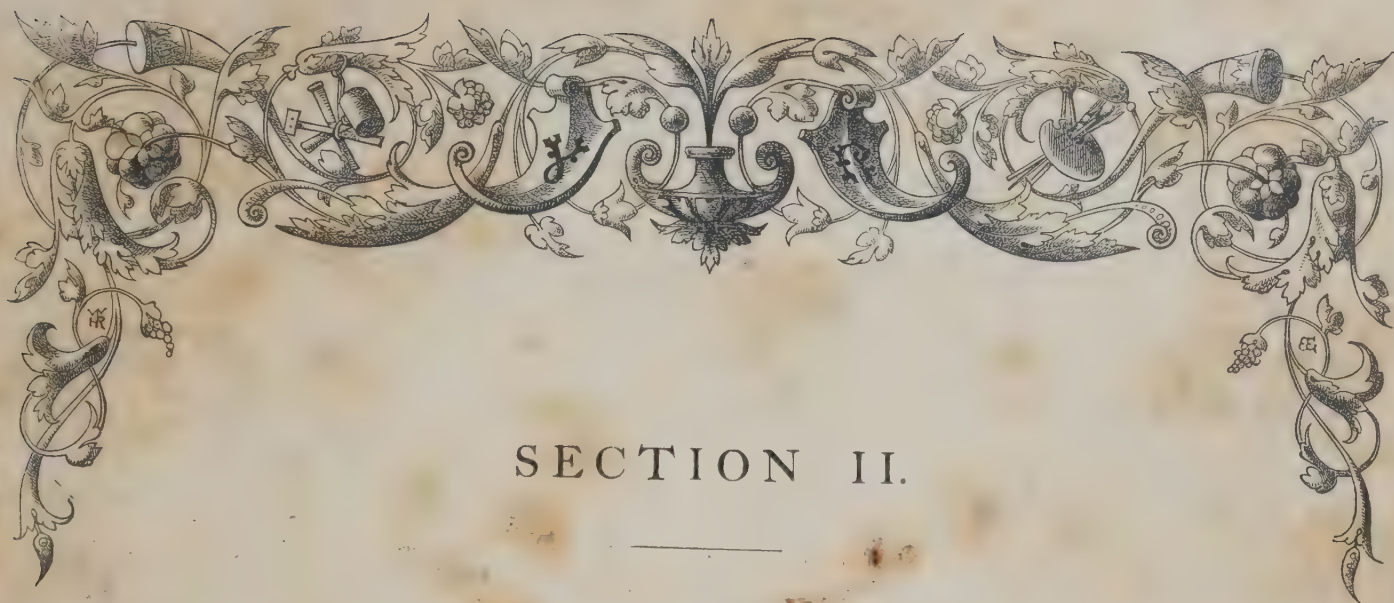
[1194]

WHITAKER & GROSSMITH, *120 Fore Street, Cripplegate, E.C.*—Perfumery and toilet soaps.

[1195]

YARDLEY & STATHAM, *7 Vine Street, Bloomsbury, London.*—Fancy soaps and perfumery.





SECTION II.

CLASS V.

RAILWAY PLANT, INCLUDING LOCOMOTIVE ENGINES AND CARRIAGES.

[1227]

ADAMS, W. B., *Holly Mount, London*.—Wheels, springs, and rail-joints.

[1228]

ALLAN, ALEXANDER, *Perth*.—Straight-link valve motion, pressure gauges, &c. (*See page 2.*)

[1229]

ANDERSTON FOUNDRY COMPANY, *Glasgow*.—Permanent way materials.

[1230]

ARMSTRONG, SIR W. G., & Co., *Elswick Engine Works, Newcastle-upon-Tyne*. — General traffic engine and tender, East Indian Railway Company.

[1231]

ASHBURY, JOHN, *Openshaw, Manchester*.—A saloon carriage. A goods waggon. Specimens of wheels and axles, axles, tires, and bar iron.

[1232]

AYTOUN, ROBERT, 3 *Fettes Row, Edinburgh*.—A railway break.

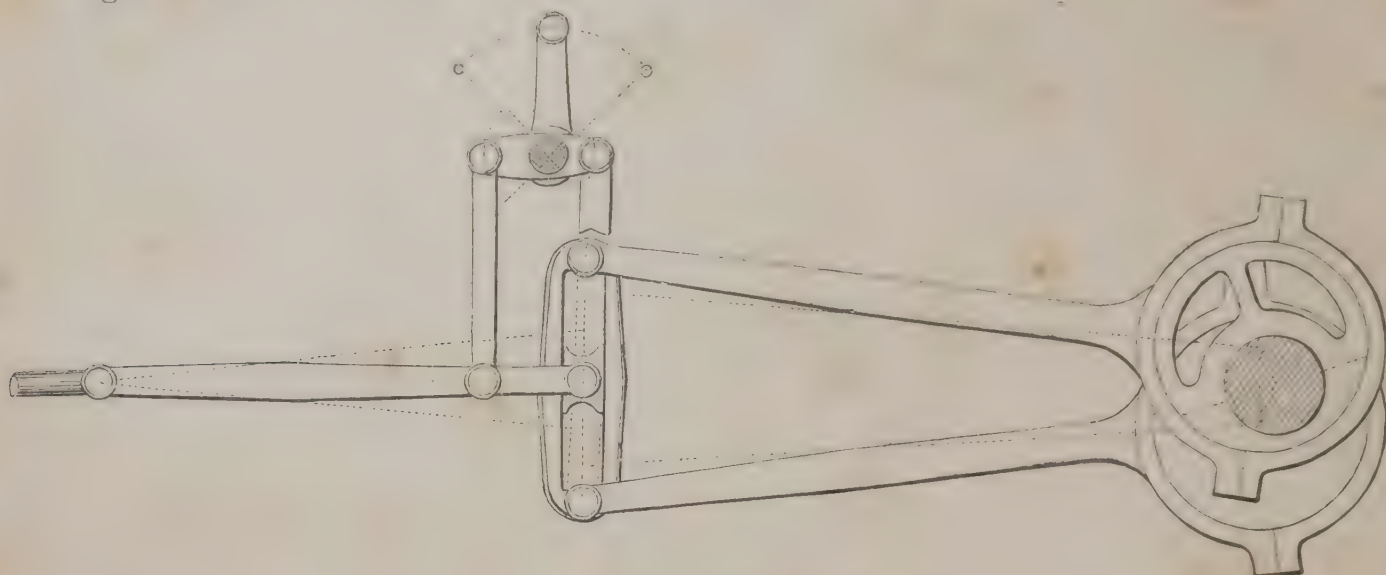
[1233]

BAIN, M'NICOL, & YOUNG, *Edinburgh*.—Wrought-iron simultaneous-acting gates for railway level crossings, and wire fencing.

[1234]

BAINES, WILLIAM, & Co., *London Works, Smethwick, Birmingham; 35 Parliament Street, Westminster, S.W.; 76 Rue de la Victoire, Paris*.—Railway plant. (*See page 3.*)

ALLAN, ALEXANDER, *Perth*.—Improvements in the expansion valve gear of steam-engines.
Straight-link valve motion.



VALVE MOTION.

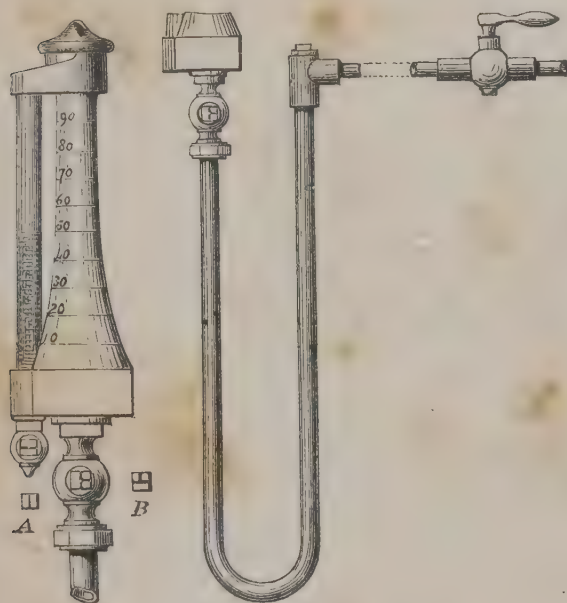
By this arrangement simultaneous movement is given to the eccentric rods and link, and to the valve rod, in opposite directions, by short levers placed on opposite sides of the reversing shaft, thereby obtaining a straight link.

This valve motion is easier of reversal, balance weights are dispensed with, and the sliding movement of the

block is reduced. The only fixings required are the reversing shaft brackets.

Most accurate results as regards an equal distribution of the steam can be obtained; while from the simplicity of the motion and from the link being straight (in place of curved), repairs are more economically executed.

Pressure gauges: indications by water rising in the gauge, compressing air within it.



PRESSURE GAUGE.

Pressure, by this gauge, is indicated by the more or less compressed or expanded condition of an accurately measured quantity of atmospheric air contained within the body of the gauge, which is acted upon by cold water contained within a bent tube.

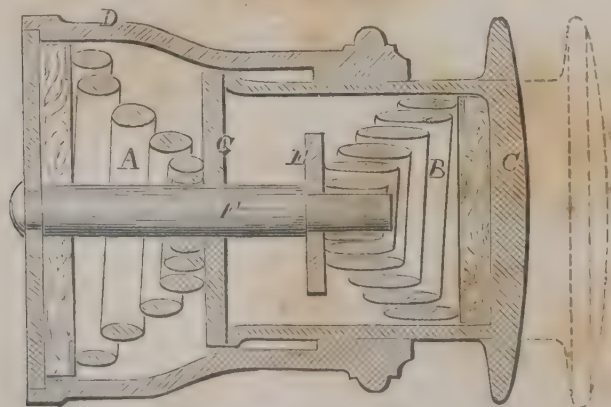
The pressure, acting on the water, forces it up the glass tube, and is indicated by the height to which the water rises, a graduated index being marked on the body of the gauge.

The principal features of this gauge are its simplicity, the durability of its parts, and facility of re-adjustment.

The air, which is the elastic spring, can be renewed at pleasure by simply turning the cocks to the positions shown at (A, B); and when the new atmosphere is thus admitted, the cocks must be reversed.

These gauges are capable of being made to suit any pressure from 1 to 5 lbs. for blast furnaces, and from 1 to 15, or up to 300 lbs. per square inch, for steam boilers or other purposes.

Compound buffer, springs with independent action, giving double resisting power in small space.



COMPOUND BUFFER.

The improvement in this buffer consists in obtaining increased resistance within a given space.

The springs used may be of steel or india rubber, as preferred, provided the principles of the arrangement be followed.

For the purpose of showing the action, the buffer is illustrated with its plunger at half stroke; the dotted lines show the position of the plunger when at rest.

It will be observed that while the first spring (A) is acting between the bottom of the cylinder (D) and the inner end of the plunger (C), the second spring (B) is acting between the front of the plunger (C) and the washer (E) fixed on the pillar (F).

There is thus a compound action; and it will be seen the resistance is exactly equal to the united power of the two springs, or, double that of an ordinary buffer.

BAINES, WILLIAM, & Co., *London Works, Smethwick, Birmingham; 35 Parliament Street, Westminster, S.W.; 76 Rue de la Victoire, Paris.*—Railway plant.

The following are exhibited:—

BAINES'S FURTHER IMPROVED SELF-CLEANING SWITCHES, offering the following advantages, viz.: The additional depth of the tongues enable the bottom flanches uncut to pass under the main rails, giving greater width of base and stability of switch. The sliding surfaces of the chairs, being placed obliquely to the seat of the main rails, and surrounded with inclined planes, enable the switch by its own action, to clear away any dirt or stones that may have lodged between the tongue and the main rail, thereby avoiding a prolific cause of accidents. This switch is perfected by an improved lever box, so arranged that nothing can impede the action of the weight. These switches gained the prize medals at the Exhibition of 1851.

BAINES AND WOODHOUSE'S PATENT CROSSING. The heart or V piece is forged solid, with its upper and lower face exactly alike, and is steeled for a length of twenty inches from the point; it takes the vertical bearing from the sides, by means of projections resting on corresponding seats in the chairs. By this arrangement the crossing can be turned over, when the upper surface is worn, and the same amount of wear can be had from the lower face.

The broad end is provided with side channels for the reception of the fish plates, to connect it with the main rails. The wing and check rails are all exact counterparts of each other. By transposing, and turning over the wing and check rails, the wearing surfaces can be renewed eight times. Thus effecting a very great economy.

By applying suitable fish plates, these crossings can be applied to any description of rail.

BAINES'S PATENT UNION-PLATE GIRDERS are specially adapted for ship building, architectural, or engineering purposes, their peculiar construction causing an absence of any strain upon the bolts or rivets.

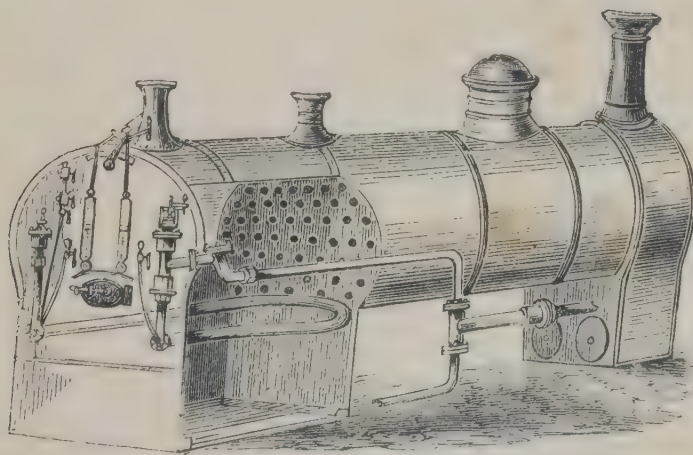
BAINES'S PATENT TURNTABLE is constructed of his patent union plates, so arranged that when fixed, a lateral and vertical union is effected, making the skeleton frame of the revolving top as rigid as a single girder, and possessing great strength combined with lightness. These tables are well adapted for shipment abroad, as they can be packed in a small compass, and are of less weight than the ordinary table. Engine tables of any dimension can be constructed on this plan. These inventions are patented in England, America, and on the Continent.

[1235]

BARKER, D., 10 *Turret-grove, Clapham.*—Steam telegraphic and fog signal.

[1236]

BATESON, SAMUEL STEPHEN, 17 *Bolton Street, London.*—Patent feed-water heating apparatus, with internal perforated safety tube.



MODEL OF PATENT FEED-WATER HEATING APPARATUS, WITH INTERNAL PERFORATED SAFETY TUBE.

By this invention, the feed-water is forced through a tube or coil placed in the fire-box before it enters the boiler, thereby receiving an amount of heat nearly equal to the temperature of the water in the boiler. The effect of this is to prevent the generation of steam from being checked, as is the case when cold feed-water is injected.

By the use of the internal perforated safety-tube, there is no possibility of the water in the coil assuming the spheroidal condition. Each end of this internal tube is connected with the water space of the boiler, and in the event of any tendency of the water in the coil towards a spheroidal condition, a small jet of water is forced by the pressure of the water in the boiler through the perforation nearest the spot, which at

once restores circulation and prevents any risk of injury to the coil.

Three locomotive engines on the London and North-Western Railway have been fitted with this apparatus, with eminently successful results in the rapid generation of steam, and economy of fuel.

In the working of the express engine, No. 248, during the six months ending 30th November, 1861, as compared with the preceding six months, the saving amounted to 27.9 per cent. upon the fuel consumed, the miles run being about 16,500 in both cases. These figures are taken from the official tables of the Company.

By the adoption of the principle involved in this invention, all boilers containing water in tubes are rendered perfectly safe in working.

[1237]

BAYLISS, SIMPSON, & JONES, 43 *Fish-street Hill*.—Iron hurdles, fencing, cable chains, anchors, screw-bolts, spikes, &c.

[1238]

BEYER, PEACOCK, & Co., *Gorton Foundry, Manchester*.—Locomotive express passenger engine and tender, designed for the South Eastern of Portugal Railway Company.

[1239]

BIDDELL, G. A., *Ipswich*.—Patent chilled railway crossings, as manufactured by Ransomes & Sims, Ipswich.

These chilled crossings have been extensively and successfully introduced during the last six years, both at home and abroad, several thousands being now in daily use.

Their simplicity, economy, and extreme durability, at once recommend them to the notice of railway engineers,

and the result of a fair trial, as invariably, leads to their adoption.

RANSOMES & SIMS, Ipswich, the proprietors of the patent, will be pleased to furnish further particulars as to prices, &c., upon application.

[1240]

BROWN, G. & I. & Co., *Rotherham Iron Works*.—Patent solid iron tires, also patent solid steel-faced tires.

[1241]

BUTTERLEY IRON COMPANY, *Derby*.—Rail.

[1242]

CLARK, GEORGE, 30 *Craven Street, Strand*.—Gas signals for railways, tunnels, telegraphs, lighthouses, ships, and fire-alarms.

[1243]

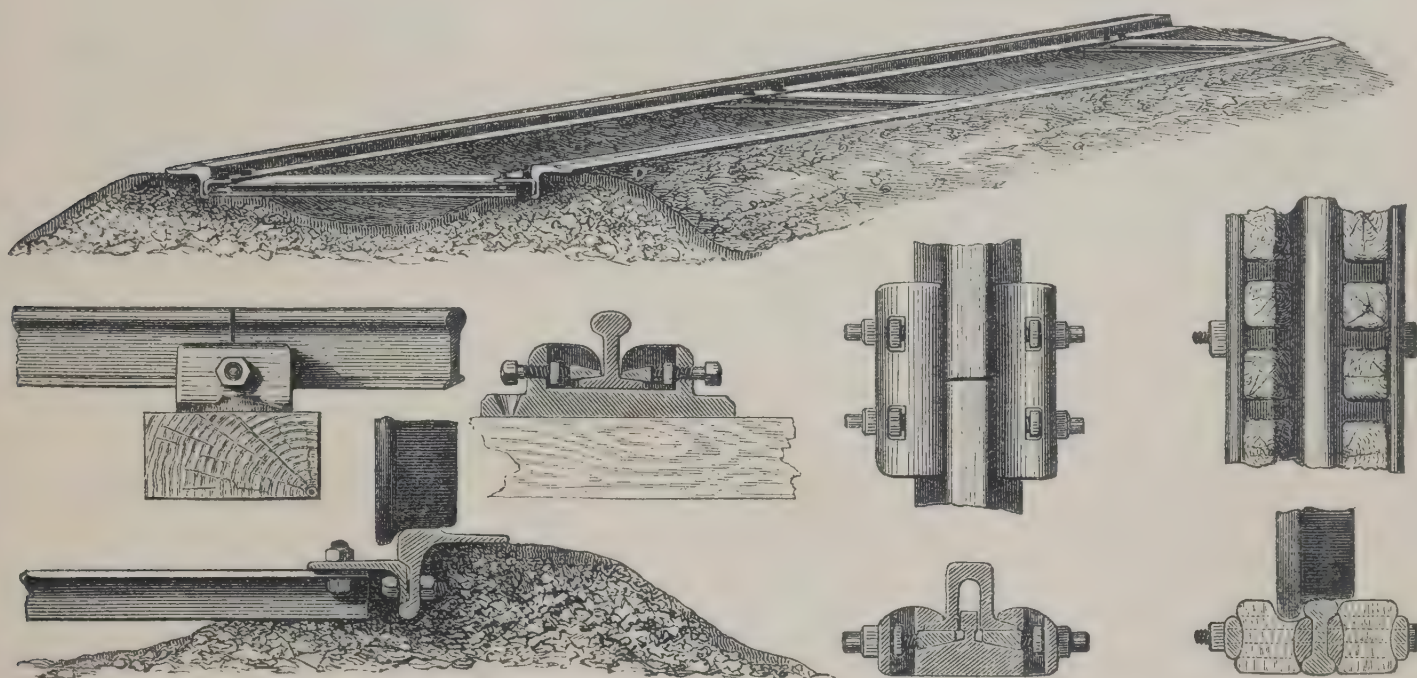
COPLING, JOHN, Esq., Inventor, *The Grove, Hackney, N.E.*—Railway signal (patented), single or double—guards' communication with drivers, and passengers' with guards.

The communication between guards and drivers is by means of the steam whistle, or a spring bell on the engine and guard's van; that from passengers to guards by a spring bell on the guard's van. The signals, in both cases, are worked by small wire ropes from a reel or drum; while, in the latter, side lines, with a flag or lantern, indicate to the guard the compartment from which the signal proceeds. On signal being made by a passenger in case of accident or other emergency, the guard can ascertain the cause of alarm without, or previous to, stopping the train, by safe and easy passage along the roofs of the carriages to the compartment, or private carriage,

indicated by the signals. Odd carriages, not fitted with the apparatus, can be let into the train at junctions, &c., without interfering with the working, as the wire ropes will be suspended over them and kept level by the balance weights. Spare compartment-lines can be always kept in store in the guard's van, and affixed instantaneously by means of spring-hooks. This apparatus is simple, cheap, and not liable to get 'jammed,' or out of order. If desired, the upper line (guard's and driver's), which is free from the control of passengers, can be used alone,—without the lower or passengers' line. The signal rods are kept lower than the chimney or luggage gauge.

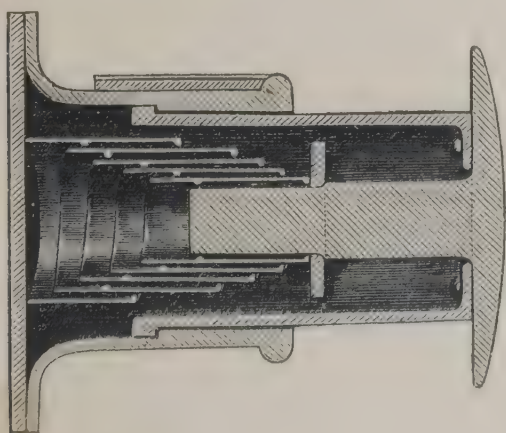
[1244]

CORLETT, HENRY LEE, *Inchicore, Dublin.*—Continuous rails; cellular brackets; joint chairs; carriage and waggon buffing springs.



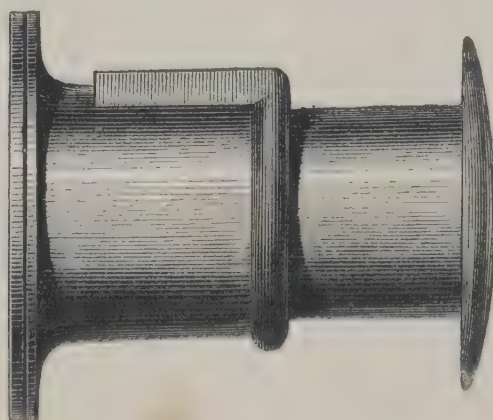
The illustration exhibits a new form of continuous, surface-supported rail, in two parts, bolted together, so as to 'break joint.' Timber sleepers, chairs, and fish plates are dispensed with; while at the same time durability of structure, improved drainage, a secure and level surface, and facility of executing repairs is attained, combined with economy in construction. This rail is laid down in the Western Annex of the Exhibition Building. The joint chairs for bridge and foot rails are of cast iron—wedge keys of wrought iron are

introduced either above or below the flanges of the rail, and are set up, and held in position, by screw bolts and nuts. These chairs may be laid on sleepers or otherwise as desired. Cellular cast iron brackets, bolted longitudinally at either side of a double T rail, are also exhibited. The cells in brackets may be filled with compressed timber, asphalt, concrete, broken stones, ballast, or other similar material. This arrangement is particularly applicable to street railways.



The BUFFING SPRINGS are Spencer and Corlett's combined Patent, and are manufactured by John Spencer & Sons, Newcastle-on-Tyne.

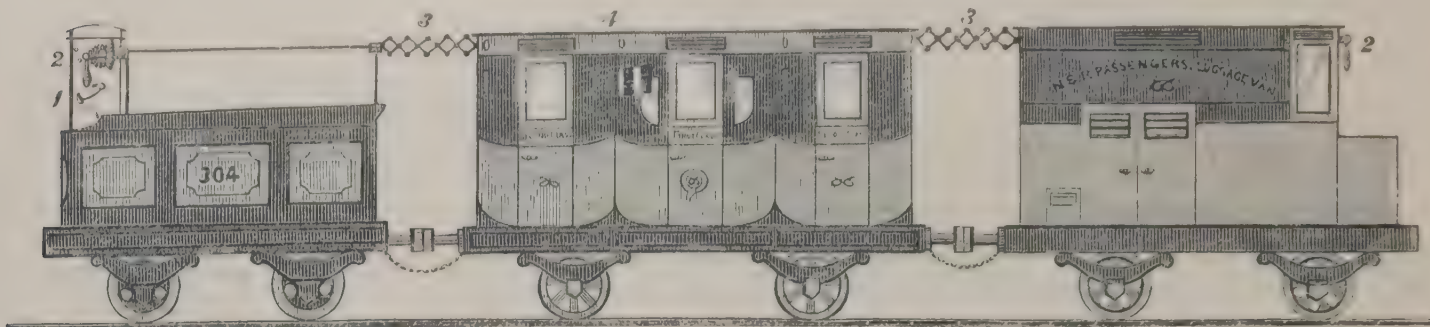
The illustration represents a waggon buffer in elevation and section; the casing, plunger, and head are all of



wrought iron, combining great strength with lightness. The plunger is without a central bolt, and cannot under any circumstances fall out, being retained in position in the casing by corresponding projections. The spring is an improved volute, provided with ribs, whereby additional strength and diminished friction is attained.

[1245]

DAVIDSON, JOHN, *Leek, Staffordshire*.—System of communication between passengers, engine-driver, and guard on railways.



1. ENGINE DRIVER'S SIGNAL BELL.

3. SIGNAL COUPLINGS.

2. HANDLES by which guard and engine-

driver com-

municate to each other.

4. THE ALARM SLIDE out of a compartment when rung by a passenger.

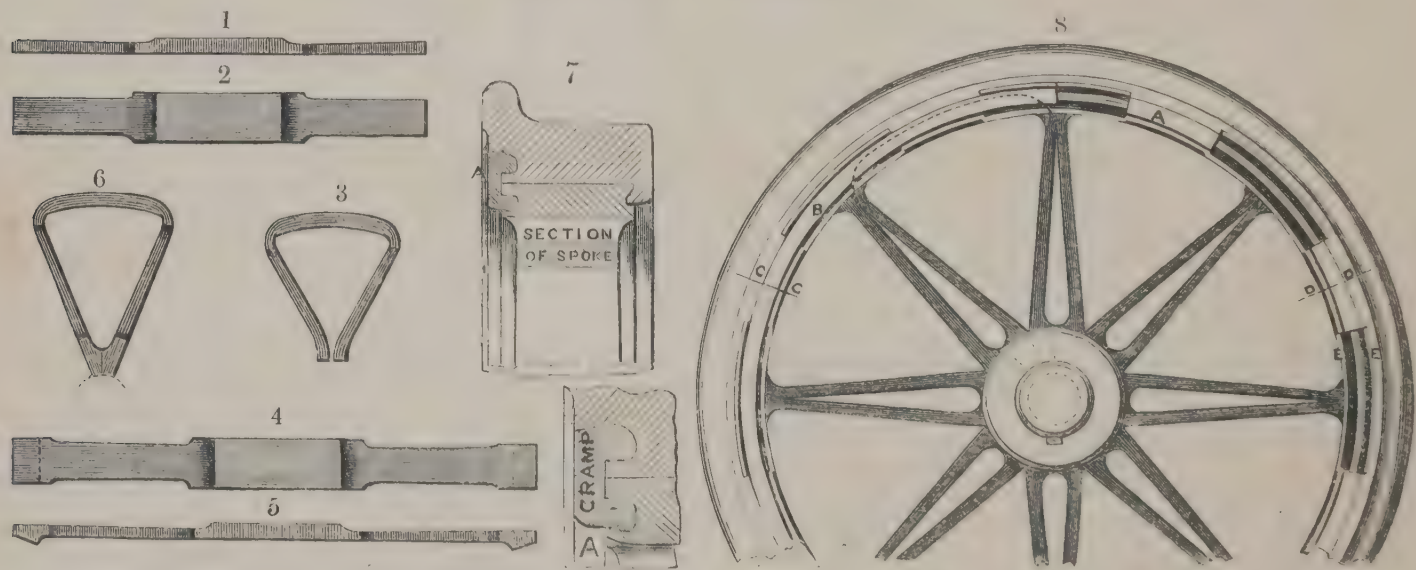
[1246]

DERING, GEORGE E., *Lockleys, Welwyn, Herts.*—Permanent way. (See page 7.)

[1247]

DIXON & CLAYTON, Engineers, *Bradford*.—Patent rolled spoke iron; railway wheels and tire fasteners.

The following are exhibited:



PATENT CRAMP FASTENINGS.

PATENT ROLLED SPOKES.

Figs. 1 and 3 are edge views, and Fig. 2 a flat view of a bar of iron suitable for making the spokes, and part of the rim, or felloe of a railway carriage wheel, with cast boss. Figs. 4, 5, and 6 spokes to form solid wrought iron wheel.

Fig 7. A, represents cramp fastening, which may be

continuous as at B, Fig. 8; and tire and rim set down all round, or at intervals, as at C C; or it may be in segments of any convenient length, as at D D.

E E are grooves in the edge of wheel rim and tire to receive the cramp fastener.

[1248]

DUNN, THOMAS, & Co., *Manchester*.—Turntables, engines, pumps, &c. (See page 8.)

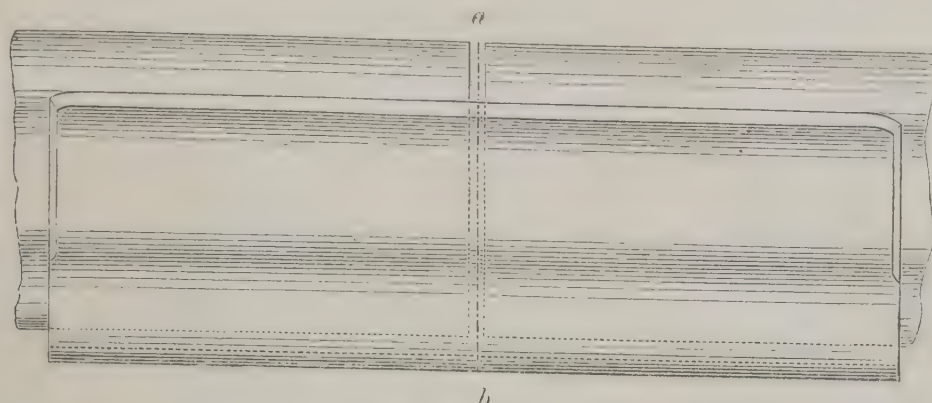
[1249]

EDINGTON, THOMAS, & SONS, *Pharnie Iron Works, Glasgow*.—Railway chairs and sleepers.

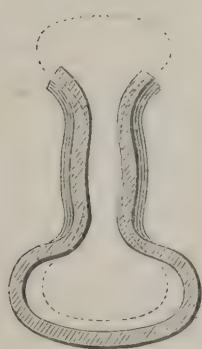
[1250]

ENGLAND, GEORGE, & Co., *Hatcham Iron Works, London, S.E.*—Locomotive engine with tender; also traversing screw-jack for railway purposes.

DERING, GEORGE E., *Lockleys, Welwyn, Herts.*—Improved permanent way of railways.



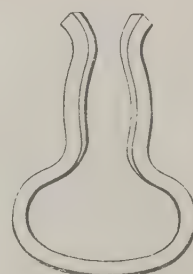
SIDE VIEW OF CLIP-JOINT.



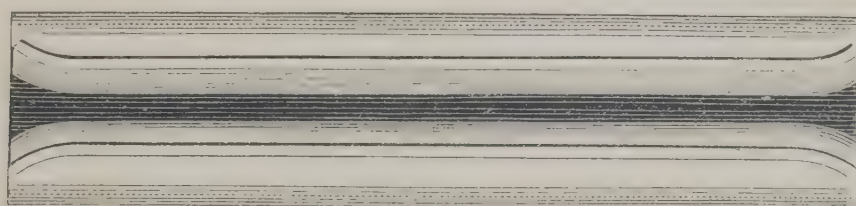
SECTION OF SPRING CLIP WHEN NOT EXPANDED BY THE RAILS.



SECTION THROUGH DOTTED LINE *a b*.



END VIEW OF SPRING CLIP.



PLAN OF SPRING CLIP.

1. **SPRING CLIP FISH-JOINTS**, of tempered steel; affording the advantage of increased strength and smoothness at the joint, by reason of the powerful and uniform pressure of the Spring Clip. Any wear or loosening that may at any time occur is immediately repaired by the inherent tendency of the Spring Clip to collapse. Safety, simplicity, and economy are likewise insured by the absence of bolts, nuts, &c., and the necessity for constant attention and labour which they entail,—one single piece of metal taking the place of the ten or fourteen separate parts which constitute the ordinary ‘fish-joint.’ The Figures show the adaptation of the Spring Clip to rails of the double-headed section, and it is applicable to other forms with equal advantage.

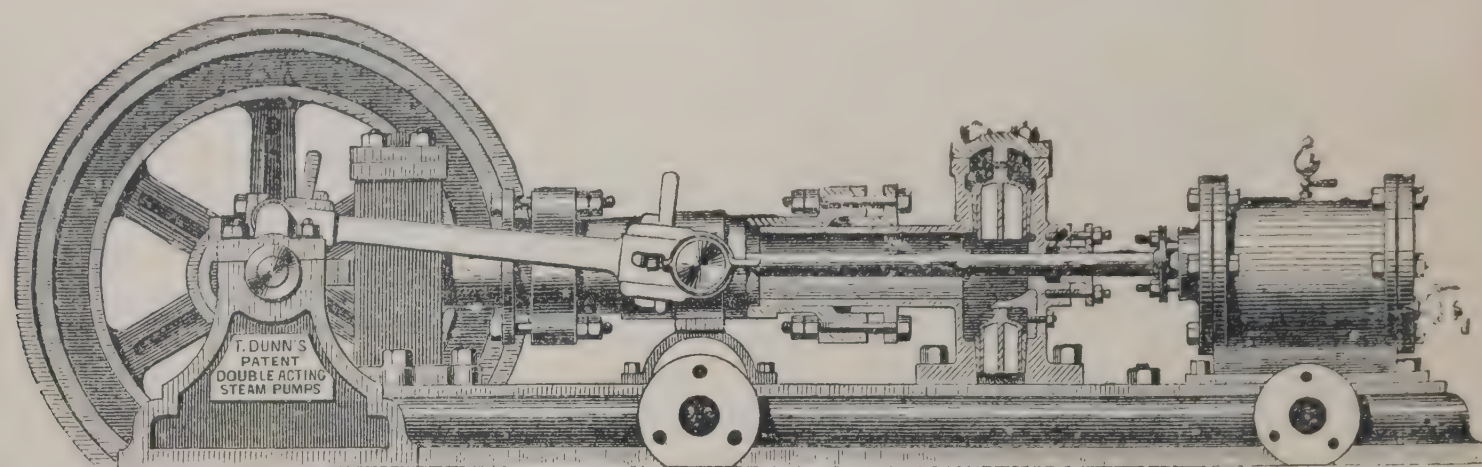
2. **SPRING KEYS**, of tempered steel; the most important advantages of which consist in the firmness with which they hold the rails, and that whilst possessing every qualification of the wooden key, without its defects, they are calculated to last at least ten times as long. The Spring Key never becomes loosened by vibration, owing to its unfailing tendency to expand, and is totally unaffected by hygrometric changes. It may be used either with intermediate or joint chairs; and forms, with the

latter, a rail-joint equal to the ordinary ‘fish,’ at less than one-half the cost.

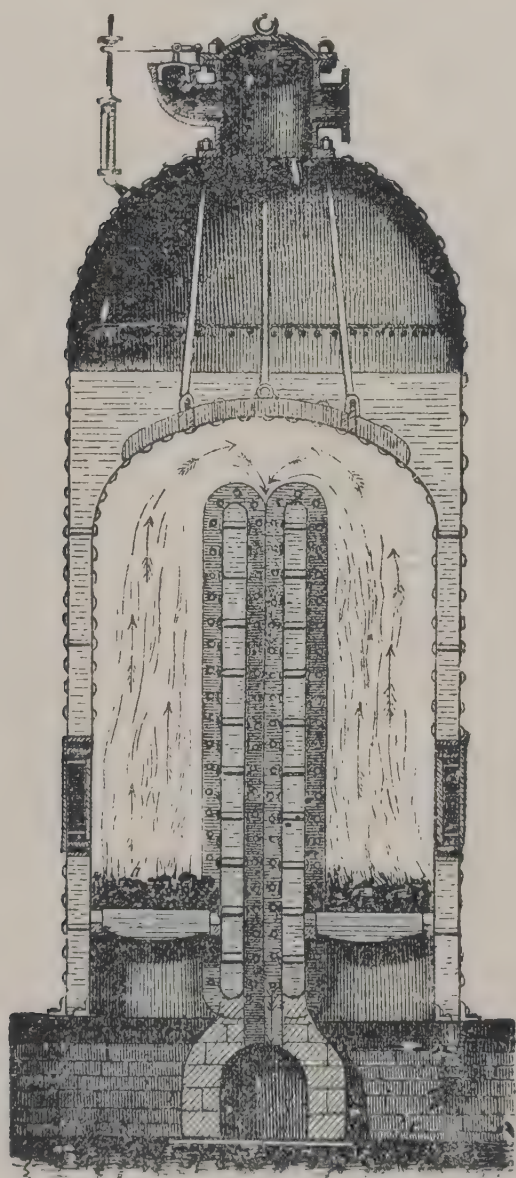
3. **SPRING TRENAILS**, of tempered steel; which possess like advantages with the spring keys, in point of efficiency and durability, over both wooden trenails and iron spikes. Owing to its permanent tendency to expand, the Spring Trenail cannot be loosened by vibration, although extracted readily, and without injury, when needful. It is not affected by weather, and cannot be broken by the tangential strain exerted at curves, or otherwise.

Examples are shown of rails united at the ends by ‘hard-soldering’ or ‘brazing.’ Brazed Joints are exhibited which have been severely tested by sledge-hammering,—the result of such treatment, when carried far enough, being to break the iron into fragments without the joint yielding. A pair of joints of this description are exhibited which have recently been taken out of the up main line of the Great Northern Railway, where they have carried the whole traffic for nearly four years, without renewal or deterioration. Eighty-six thousand locomotive engines, and nearly four million wheels of rolling stock, have passed over these joints, which are as sound and perfect as when first made.

DUNN, THOMAS, & Co., Windsor Bridge Iron Works, Manchester.—Turntables, traversers, cranes, engines, boilers, pumps; hydraulic machinery.



PATENT DOUBLE ACTION STEAM PUMP.



PATENT DOUBLE DRAUGHT SMOKE BURNING BOILER.

MACHINERY IN FULL OPERATION.

Wrought Iron Geared Locomotive Engine Traverser. 20ft. long.—Dunn's Combined Patents.
Wrought Iron Frame, deep-wheel easy running Traverser, 15ft long.—Dunn's Combined Patents.
Wrought Iron Plate, deep-wheel easy running Traverser, 15ft. long.—Dunn's Combined Patents.
Wrought Iron Surface Turntables, 15ft. diam. — Dunn's Patent.

Cast Iron Solid Ring Turntables, centre and curb for a 13ft. diam., as used in Her Majesty's Dockyards.—Dunn's Patent.

Cast Iron Turntable, as used in Her Majesty's Store Houses, 8ft. diam. Patent self-foundation.

Double Action Steam Pump.—Dunn's Patent.

Improved Hydraulic, self-balanced Cross-head Wheel Forcing Machine.

Dunn's Improved Hand Pumps for Railway Stations, Tanks, Agriculture, Ships, &c.

Roof over part of these goods, in yard.—Dunn's Patent.

MODELS.

Wrought Iron Geared Locomotive Engine Traverser.—Dunn's Combined Patents.

Wrought Iron Frame deep-wheel easy running Traverser.—Dunn's Combined Patents.

Wrought Iron Traverser for heavy Carriages.—Dunn's Combined Patents.

Wrought Iron Traverser for Carriages. — Dunn's Combined Patents.

Cast Iron Solid Ring Turntable, as used in Her Majesty's Dockyards.—Dunn's Patent.

Wrought Iron Engine Beam Turntable.—Dunn's Patent.

Wedge beam Turntable.—Dunn's Patent.

Safety Carriage and Break for High Speeds.—Dunn's Patent.

Wrought Iron Lattice, and Steel Lattice, Basket Bridge Work.

Ditto, made from Rail Bars and Ribbed Iron.

DRAWINGS.

Dunn's Improved Hydraulic Self-balanced Cross-head Wheel-forcing Machine.

Dunn's Patent Wrought Iron Engine beam Turntable.

Traverser, sheet A.—Dunn's Combined Patents.

Traverser, sheet B.—Dunn's Combined Patents.

Traverser, sheet B.—Dunn's Combined Patents.

Dunn's Improved Hydraulic Machine for testing Cables, Beams, and Anchors.

Dunn's Patent Retort Steam Boiler.

Rose's Patent Multitubular Steam Boiler.

Dunn's Patent Double-action Steam Pumps.

Dunn's Improved Steam Travelling Cranes.

Improved Steam Wharf Cranes.

Improved 30 tons Travelling Crane.

Dunn's Patent Double-draught Smoke-burning Boiler.

Improved Horizontal Engine, as working Machinery at the Crystal Palace.

Dunn's Patent Cast Iron Solid Ring Turntable, as used in Her Majesty's Dockyards.

[1251]

FAIRBAIRN, W. & SONS, *Manchester*.—Locomotive engine. (*See page 10.*)

[1252]

FAY, CHARLES, *Lancashire and Yorkshire Railway, Manchester*.—Continuous railway-carriage breaks.

These breaks are powerful and simple, and in their self-adjusting motion possess a great advantage over any other. The blocks will be worn out without any regulation being required, by means of this motion, which at the same time prevents the guard from working them too

far from the periphery of the wheels. The breaks may be seen in use on the London and North Western, Great Northern, North Eastern, Lancashire and Yorkshire, West Midland, and other railways.

[1253]

GARDNER, SANKEY, *Neath*.—Axle-box, securing efficient connection with spring. Truck-buffer, cheaply constructed and repaired.

[1254]

GLOUCESTER WAGGON COMPANY (Limited), *Gloucester*.—Railway waggon with iron body, for discharging coal into ships.

[1255]

GOVERNOR AND COMPANY OF COPPER MINERS IN ENGLAND, *Cwm Avon Works, Glamorgan-shire*; W. P. Struvé, Esq, *Manager of the Works*.—Offices: 10 *New Broad Street Mews, London, E.C.*

Obtained Prize Medal for Railway Iron at the Great Exhibition of 1851, and Grande Medaille d'Honneur for Railway Iron at the Paris Exhibition, 1855.

ONE BRIDGE RAIL, 90 feet long, 58 lbs. per yard.
ONE FLANCH RAIL, 63 feet long, 3 $\frac{3}{4}$ lbs. per yard.

Various sections of RAILS made at the Cwm Avon Works.

[1256]

GRANT, WILLIAM, 6 *Alice Street, Liverpool*.—System of reflecting mirrors, day and night signals, and communications on railway trains, to prevent accidents.

[1257]

HARRISON & CAMM, *Rotherham Waggon Works, Masbro'*.—Railway coal waggon.

RAILWAY CARRIAGES OF ALL KINDS.
RAILWAY CARRIAGE TRUCKS.
RAILWAY HORSE-BOXES.
RAILWAY LUGGAGE BREAK VANS.
RAILWAY GOODS BREAK VANS.
RAILWAY MINERAL BREAK VANS.
RAILWAY CATTLE TRUCKS.

RAILWAY SHEEP TRUCKS.
RAILWAY GOODS WAGGONS, OF SORTS.
RAILWAY TIMBER TRUCKS.
RAILWAY COAL WAGGONS.
RAILWAY COKE WAGGONS.
RAILWAY MINERAL WAGGONS.
RAILWAY BALLAST WAGGONS, for home or abroad.

Harrison & Camm manufacture every description of Railway Waggon for Sale or Hire.

[1258]

HATTERSLEY, WILLIAM, 135 *St. George Street, E.*—Passengers' signal for railway carriages, for ready communication with drivers, guards, &c.

[1259]

HENSON, WILLIAM FREDERICK, Civil Engineer, 15 *New Cavendish Street, Portland Place, London*.—Railway buffers and bearing springs.

The advantages of these buffer springs are, that they are combined in their action, whereby a greater power of resistance is offered with a less weight of steel than any other spring now in use, and at a less cost.

The grooved steel bearing springs possess great strength, combined with durability and cheapness in their manufacture, doing entirely away with spring fittings.

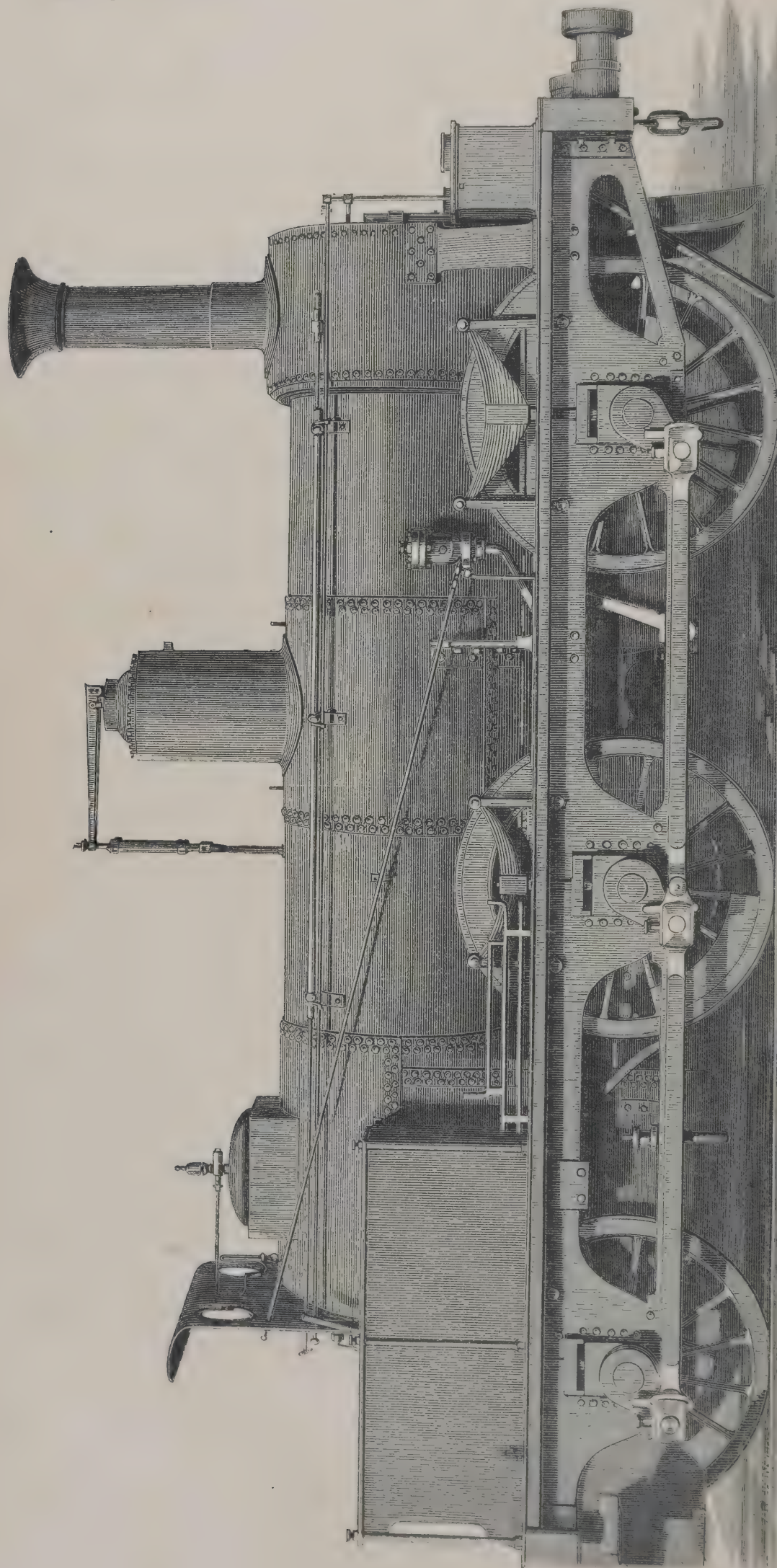
They are made by Bradley & Co., who are manufacturers of every description of railway buffers and bearing springs, Rishworth patent springs, and Price & Hawkins' patent fish plates.

For further information, application should be made to Bradley & Co., Broomhall, Sheffield.

[1260]

HOY, J., 6 *Pickering Place, W.*—Railway signal.

FAIRBAIRN, WM., & SONS, *Manchester*.—Goods locomotive constructed for the Midland Railway Company.



The boiler is composed entirely of thick edged-plates, and is double-riveted throughout. No angle iron is used, the barrel of the boiler being flanged where attached to the tube plate. The principal dimensions are: Boiler barrel—11 ft. 6 in. long, 4 ft. 3 in. diameter. Fire box—4 ft. 9 in. long, 4 ft. 3 in. wide. Plates of barrel— $\frac{7}{16}$ in. thick. Plates of fire box— $\frac{1}{2}$ in. thick. Copper fire-box—4 ft. 0 $\frac{1}{2}$ in. long, 3 ft. 7 in. wide, and 4 ft. 8 $\frac{1}{2}$ in. deep.

Brass tubes—2 ft. diameter, 180 in number. Heating surface—1160 square feet. Cylinders—16 in. diameter, 24 in. stroke. Wheels—5 ft. 2 in. diameter, six coupled with outside cranks. Crank axle has four bearings—the inside 6 $\frac{3}{4}$ in. diameter, and the outside 6 in.; the leading and trailing axles have outside bearings 6 in. diameter.

The Engine is designed by Mr. Kirtley, Engineer to the Midland Railway Company.

[1261]

HUGHES, HENRY, *Falcon Works, Loughborough.*—Models of plant used by railway contractors.

1. Drawing of a locomotive engine for contractors and mineral railways, and all purposes where a light engine is required to ascend steep gradients and turn sharp curves.	£450 0	6. Model of strong dobbin cart with patent wheels	£8 5
2. Model of end-tipping waggon to hold three cubic yards. These waggons are made of stout elm, and put together with the best ironwork	13 0	7. Model of an improved horse power which occupies a very small space and gives out the full power of the horse	18 0
3. Model of side-tipping waggon	14 0	8. Hughes's patent combined iron and wood wheel, which possesses great strength and durability, and entirely obviates the decay and shrinkage of wooden wheels.	
4. Model of hand cart for earth work	4 10	9. Model of a stout 2-horse cart for contractors' purposes	17 0
5. Model of contractors' or builders' travelling crane to lift three tons.	55 0		

[1262]

ISCA FOUNDRY COMPANY, *Newport, Monmouthshire.*—Switches &c. (*See page 12.*)

[1263]

KINGSTON, WM. H., A.B., Trin. Coll. Dublin, *Bandon.*—Means of verbal communication on railway trains.

Extract from the Report of Colonel Yolland, R.E., to the President of the Board of Trade :—

‘I have examined Mr. W. H. KINGSTON's plans for “verbal communication between the passengers and guards, and guards and engine drivers on railway trains,” and I have the honour to report that it is generally described in Mr. Kingston's circular, dated 25th June, 1859. The tubing is intended to be placed on the tops of the car-

riages, an arrangement being proposed for getting over the difficulties likely to arise from the inequality in the height of the carriages which usually form a train, as well as for the wriggling motion of the carriages when travelling.

‘The subject has evidently been fully considered by Mr. KINGSTON, and the arrangements proposed are very ingenious.’

[1264]

KITCHIN, RICHARD, *Warrington.*—Weighing machinery, cranes, and railway plant. Full-size models and drawings.

The following machines are exhibited

1. A SIX-TABLED ENGINE-WEIGHING MACHINE, as used by the chief locomotive engineers of Great Britain, but with the addition of Hind's patent steelyard, by which it is rendered the most complete compound weighing machine extant. No locomotive engine stables can be considered complete without this machine.

2. A HIND'S PATENT WEIGHING CRANE of twenty tons'

power, for an overhead travelling crane. This machine will raise an article, and, while holding it suspended, will indicate its weight. This will be found a most useful apparatus in foundries, boiler works, &c.

3. A variety of WEIGHING MACHINE, STEELYARDS, and their fittings.

4. Drawings of TURNABLES, CRANES, and WEIGHING MACHINERY.

[1265]

LANAUR, L., *4 South Street, Finsbury.*—Axle-boxes and bearings.

[1266]

LILLESHALL COMPANY, *Shiffnal, Shropshire.*—Colliery locomotive. (*See page 13.*)

[1267]

LITTLE, CHARLES, *71 Little Horton Lane, Bradford.*—Safety coupling for railway waggons.

By means of this invention, much of the danger to human life attending the ordinary method of coupling, is obviated; and time is saved in the marshalling of railway

trains. Some of these couplings are in use by the Midland, Great Northern, Manchester, Sheffield and Lincolnshire, and other railway companies.

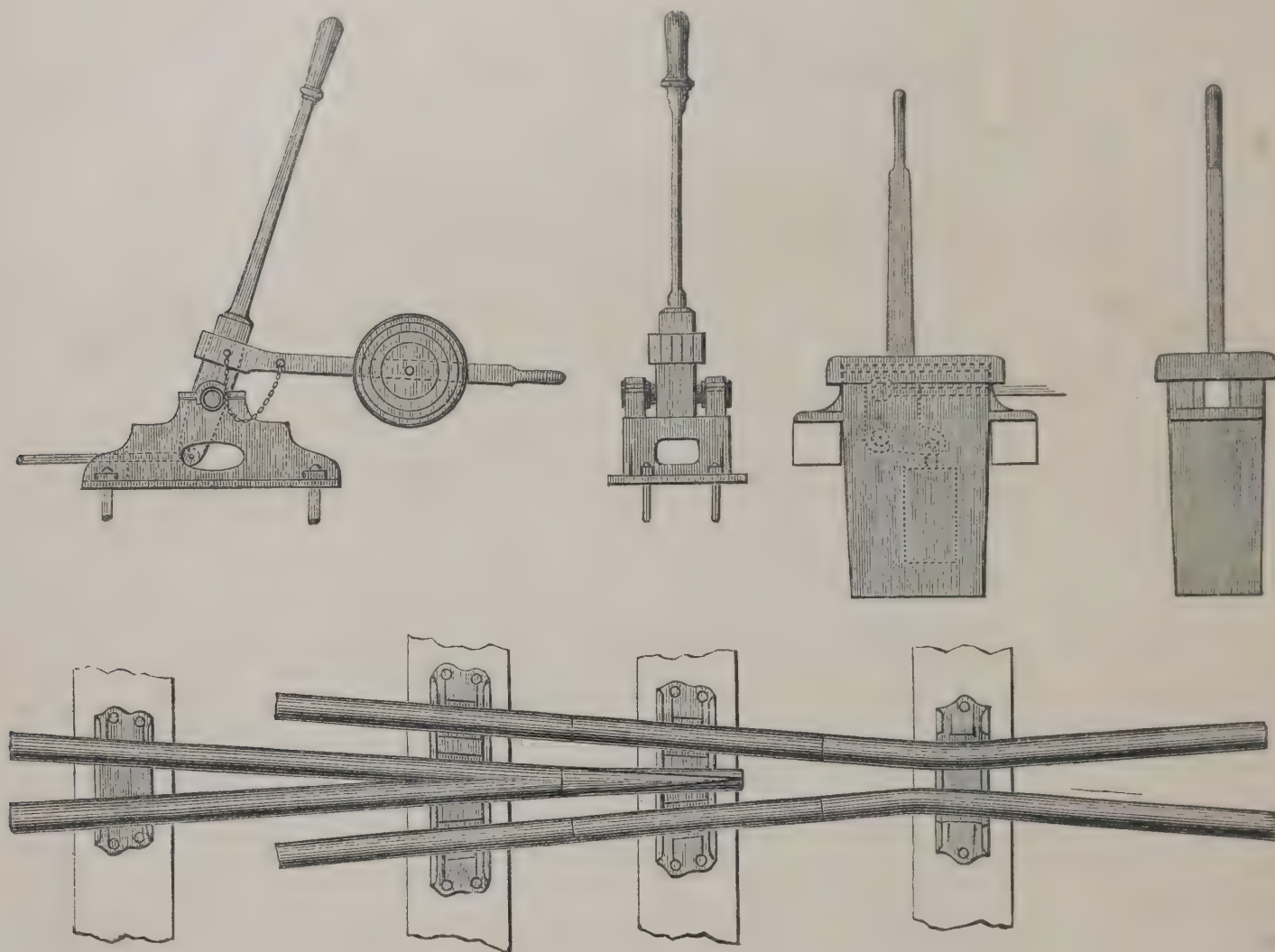
[1268]

LLÓYDS, FOSTERS, & Co., *Old Park Iron Works, Wednesbury.*—Wheels and axles, turntables, cranes, tires; samples of iron.

Manufacturers of all kinds of Railway Plant; including bridges of wrought and cast iron, turntables, wheels and

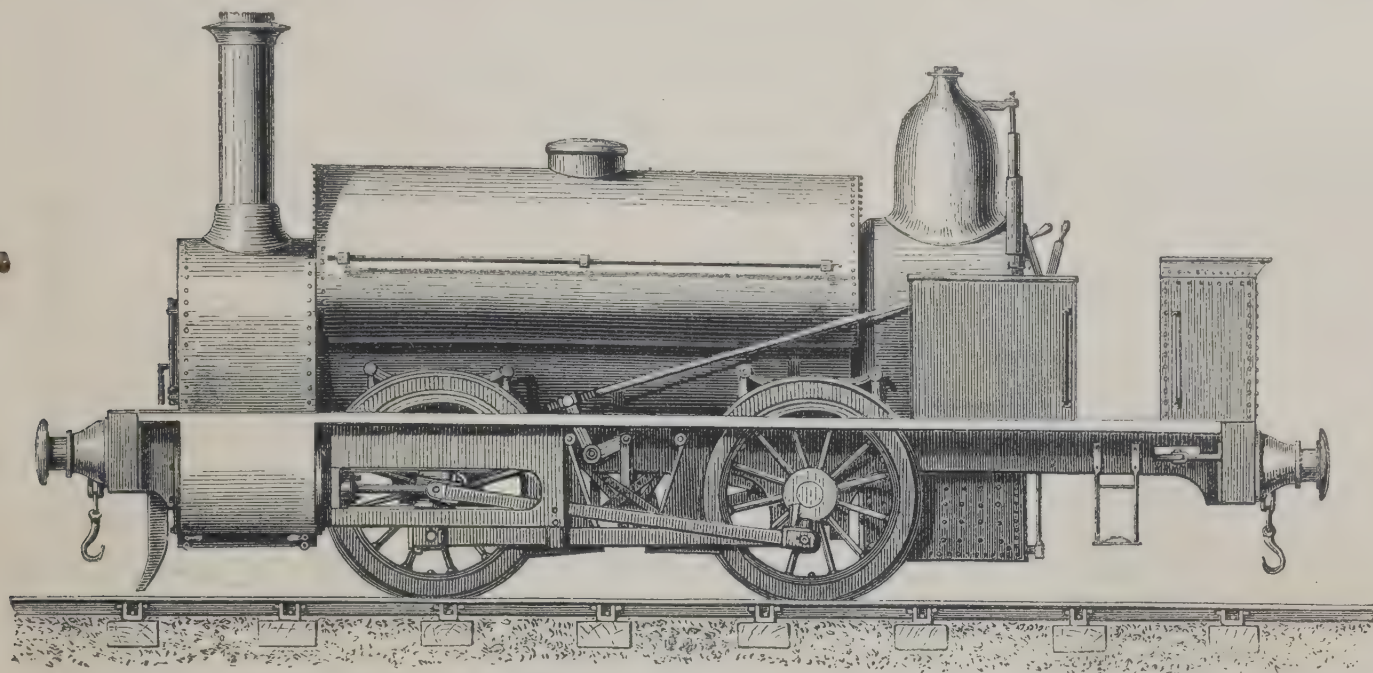
axles, switches and crossings. Also, of the very best descriptions of tires, axles, boiler plates, and bar iron.

ISCA FOUNDRY COMPANY, *Newport, Monmouthshire.*—Switches, crossings, chairs, lever-boxes, axle-boxes, chilled and dobbin wheels. Lithographs &c.



- | | |
|--|---|
| 1. A SET OF PATENT BESSEMER CAST STEEL SWITCHES AND STOCK RAIL. | 15. DISC SIGNAL CAPSTAN LEVER BOX. |
| PATENT WELDED CAST STEEL CROSSING. | 16. QUADRANT SIGNAL LEVER BOX. |
| 1a. DOUBLE HEAD SWITCHES, AND SOLID WELDED CROSSING. (ORDINARY RAILS.) | 17. SELF-ACTING DISC SIGNAL LEVER BOX. |
| 2. SET OF PARSONS'S PATENT SWITCHES. | 18. CRANK BOX. |
| 3. CARR'S PATENT FILLED CROSSING. | 19. SAYERS'S PATENT CHAIR. |
| 4. WELDED CROSSING (VIGNOLE'S RAIL.) | 20. MARSH'S BRACKET CHAIR. |
| 5. GRAND RUSSIAN CROSSING WITH SOLID POINT. | 21. FENTON'S PATENT JOINT CHAIR. |
| 6. SOLID WROUGHT STEELED CROSSING POINT. | 22. WROUGHT-IRON DOBBIN CART WHEELS AND AXLES. |
| 7. CARR'S PATENT OBTUSE OR OVER CROSSING. | 23. CONTRACTOR'S CHILLED WHEELS. |
| 8. OBTUSE CROSSING OR ANGLE. (VIGNOLE'S RAIL.) | 24. CARR'S PATENT AXLE-BOX. |
| 9. CONTRACTOR'S CAST IRON CROSSING. | 25. SPECIMENS OF WAGGON AXLE-BOXES. |
| 10. VARIOUS CONNECTING RODS FOR SWITCHES. | 26. WOOD'S PATENT TURNTABLE, WITH WROUGHT-IRON ROLLER PATH. |
| 11. OVERGROUND LEVER BOX AND WEIGHT. | 27. CARRIAGE OR WAGGON TURNTABLE, WITH CAST-IRON ROLLER PATH. |
| 12. UNDERGROUND LEVER BOX WITH WEIGHT ENCLOSED. | 28. ENGINE BALANCE TURNABLES, WITH OR WITHOUT GEARING. |
| 13. EXCENTRIQUE LEVER BOX AND WEIGHT. | 29. PILLAR, HOSE, AND SWING WATER CRANES. |
| 14. EXCENTRIQUE LEVER BOX AND WEIGHT. | |

LILLESHALL COMPANY, *Shifnal, Shropshire.*—An extra strong colliery or contractors' locomotive for curves and heavy gradients.



LOCOMOTIVE ENGINE.

The Lilleshall Company having had great experience in the working of locomotives of different makers in their own works, submit for exhibition a tank locomotive of simple and substantial construction, proved to be most suitable for colliery and contractors' purposes.

This engine has outside cylinders, four wrought-iron wheels coupled, hardened steel-link motion, expressly arranged for keeping the boiler unusually low in the frame, steel piston rod, slide bars, copper fire box and steam pipes, brass tubes, patent brass fittings. It is also fitted with the Lilleshall Company's patent compensating buffers, which adapt themselves to take an equal strain round

sharp curves. The whole is built extra strong, to resist the wear and tear of heavy gradients, sharp curves, and the frequent inequalities of colliery roads.

The exhibitors are manufacturers of all kinds of high pressure expansive and condensing engines, sugar and other mills, heavy machinery for forges and rolling mills, chilled and grain rolls, cylinders, &c.; all made from their well-known Lilleshall cold blast iron, of the best workmanship, and at moderate prices.

Some specimens of coals and argillaceous ironstones, from which Lilleshall pigs are made, may be seen in Class I.

[1269]

LONDON AND NORTH-WESTERN RAILWAY COMPANY, *Works at Crewe.*—Locomotive engine and tender. (*See page 14.*)

[1270]

Apparatus for supplying water to tenders whilst in motion. (*See page 14.*)

[1271]

Wrought iron chair. Duplex safety valve. (*See page 14.*)

[1272]

MCCONNELL, JAMES, *West Houghton, Bolton-le-Moors.*—Self-acting railway signal for day and night.

[1273]

MACINTOSH, CHARLES, & Co., *3 Cannon Street West, London; and Cambridge Street Manchester.*—Vulcanised rubber buffers, bearing springs, &c.

[1274]

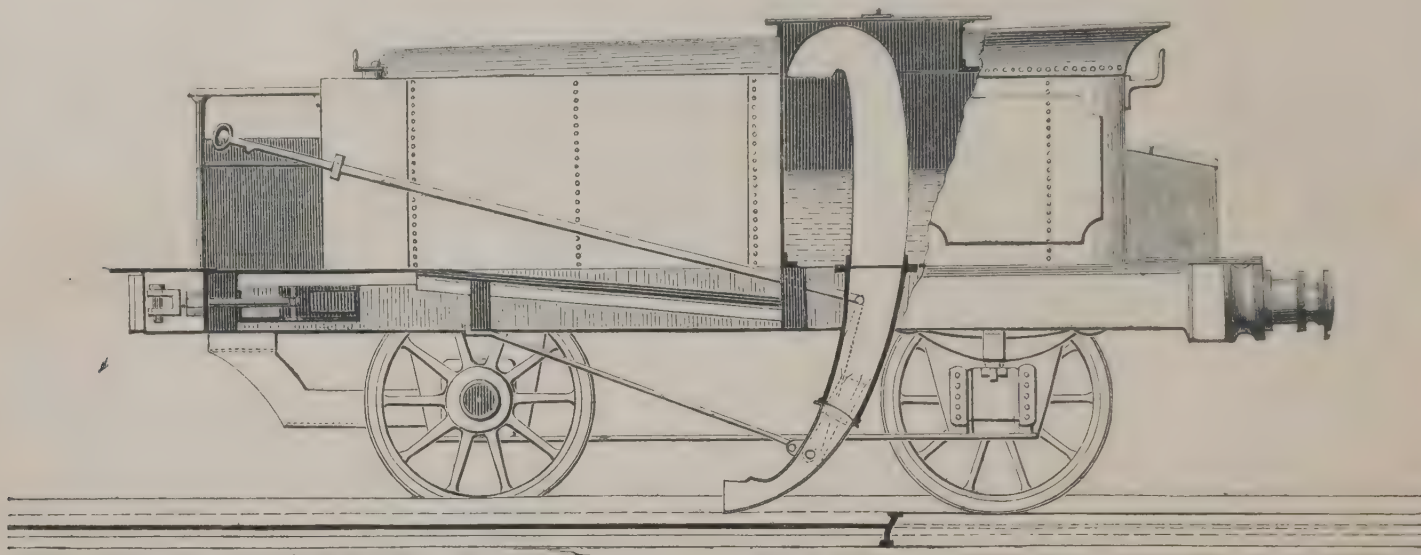
MANNING, WARDLE & Co, *Boyne Engine Works, Hunslet, Leeds.* (*See page 15.*)

LONDON AND NORTH-WESTERN RAILWAY COMPANY, *Works, Crewe.*—Locomotive engine and tender.

LOCOMOTIVE ENGINE.—Designed and built by Mr. Ramsbottom, Locomotive Superintendent, Crewe, and exhibited as a specimen of a first-class passenger engine. It is fitted with patent pistons, duplex safety valves and lubricators, and is adapted for burning coal with great

economy. An engine of this class ran the American express on the 7th January 1862, a distance of $130\frac{1}{2}$ miles without stopping, at an average speed of 54 miles per hour. The tender attached is fitted with Mr. Ramsbottom's apparatus for taking up water whilst running.

LONDON AND NORTH-WESTERN RAILWAY COMPANY, *Works, Crewe.*



APPARATUS FOR SUPPLYING WATER TO TENDERS WHILST IN MOTION.

This is the invention of Mr. Ramsbottom, Locomotive Superintendent, Crewe. The plan has been in daily operation on the Chester and Holyhead Railway since it was first adopted in the winter of 1859—60. By it various quantities of water, from 1200 gallons downwards, can be

picked up at speeds ranging from 22 to 50 miles or upwards per hour. In the running of the Irish mails, the arrangement has the effect of reducing the dead weight of the tender about 6 tons, equal to the weight of a loaded carriage.

LONDON AND NORTH-WESTERN RAILWAY COMPANY, *Works, Crewe.*—Wrought iron chair for permanent-way. Duplex safety valve.

WROUGHT IRON CHAIR.—Invented by Mr. Ramsbottom, Locomotive Superintendent, Crewe. The above are made from rolled bars of suitable section, and are cut off whilst hot to the requisite breadth. The rails are held by the sides and shoulders, and are not in contact with the bottom of the chair. The lower head of the rail is consequently not indented, so that when inverted the second head is as good as the first. Both chairs and keys are of wrought iron, so that they do not get loose nor break. The chair has also a very broad base in proportion to its weight, and is therefore not so easily crushed into the sleeper. It is, moreover, applicable to a variety of sec-

tions of rails, by merely altering the form of the keys or filling-in pieces.

DUPLEX SAFETY VALVE.—This arrangement of safety valve, the invention of Mr. Ramsbottom, Crewe Works, is intended to prevent the boiler to which it is applied from being subjected to any pressure in excess of that to which it is adjusted. If any weight is put upon the lever, it has the effect of reducing the pressure, instead of increasing it, as in the ordinary arrangement. It requires no spring balance, and gives a much wider opening for a given excess of pressure, than the ordinary valve.

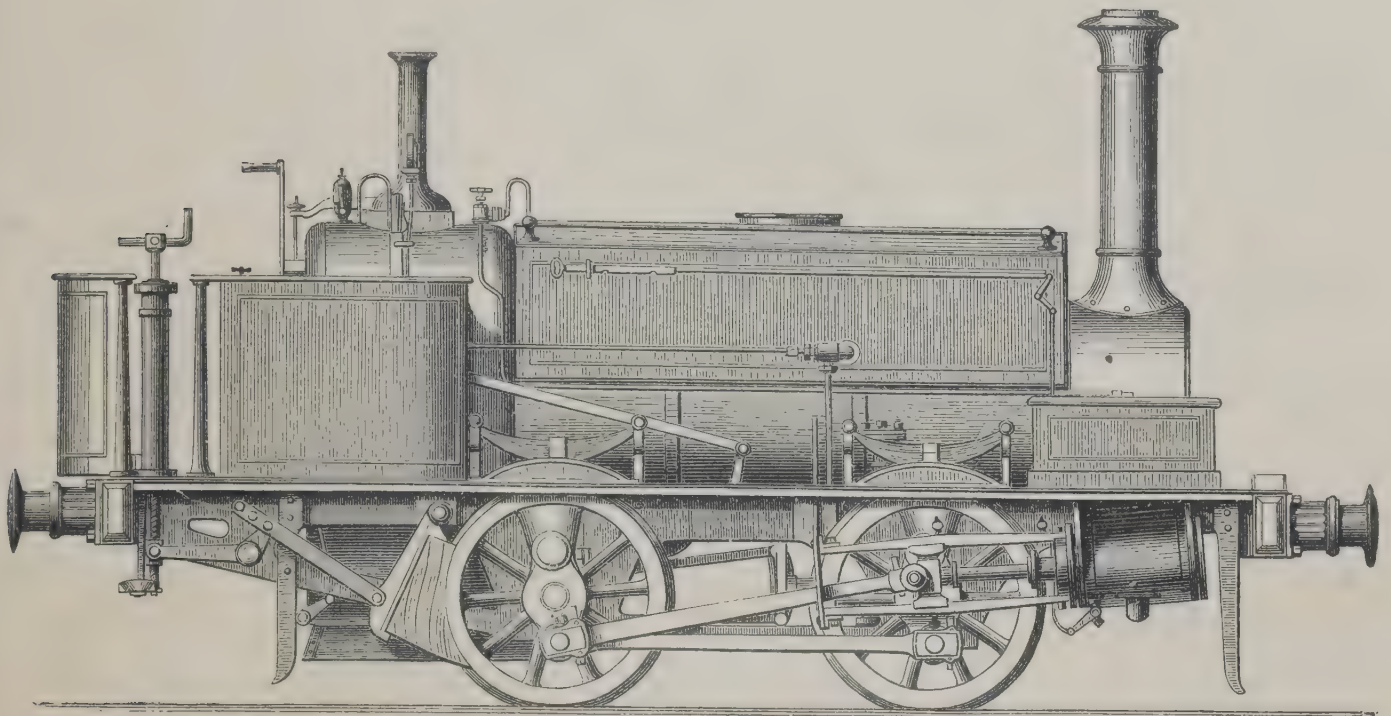
[1275]

MORRIS, E., 8 *Albert Square, Clapham Road, S.*—Patent iron wedge for securing railway rails in their chairs.

[1276]

MOULTON & Co., *Bradford, Wilts.*—Buffers.

MANNING, WARDLE, & Co., *Boyne Engine Works, Hunslet, Leeds.*—Locomotive tank engine, for contractors, collieries, &c.



LOCOMOTIVE MINERAL TANK ENGINE.—Outside cylinders 9 in. diameter, and 14 in. stroke; wheels 2 ft. 9 in. diameter, all coupled; copper fire-box and brass tubes; boiler, axles, and wheel tires, of best Yorkshire iron. The tank holds 250 gallons; weight, in working trim, $10\frac{1}{4}$ tons.

This little tank engine was designed expressly for the mineral traffic at iron works, collieries, &c., and will go round any curve where an ordinary railway waggon will pass.

It is also admirably adapted for contractors' purposes; the wheels being small, it will ascend steep gradients,

and, from its lightness, may readily be worked over contractors' metals, where a larger engine could not safely be used.

The engine can be constructed for lines of 3 ft. gauge and upwards, and the buffers placed to suit any special mineral or ballast waggons.

PHOTOGRAPHS.—The frames contain photographs of some of the many classes of engines, boilers, and other machinery, made by the same firm.

For prices and further particulars apply to MANNING, WARDLE, & Co.

[1277]

MURPHY, JAMES, *Railway Works, Newport, Monmouthshire.*—Pair of dovetailed-tire railway wheels, and safety bolt and nuts.

[1278]

NEATH ABBEY IRON COMPANY, *Neath.*—Locomotive engine for collieries, mine works, and quarries.

[1279]

NEILD & Co., *Dallam Iron Works, Warrington, Lancashire.*—Railway wheels, axles, tires, and bar iron, &c.

[1280]

NEILSON & Co., *Hyde Park Locomotive Works, Glasgow.*—Eight-foot wheel express engine.

[1281]

NETHERSOLE, W. E., *Swansea.*—Model of the frame of a railway-waggon, showing exhibitor's side-chain arrangement.

[1282]

NETHERSOLE, W. E., *Swansea.*—Model of improvements in draw gear and end-tipping waggon flaps.

[1283]

NEWALL, JAMES, *Bury, Lancashire.*—Continuous railway breaks; signal, and patent gas apparatus for lighting railway trains.

[1284]

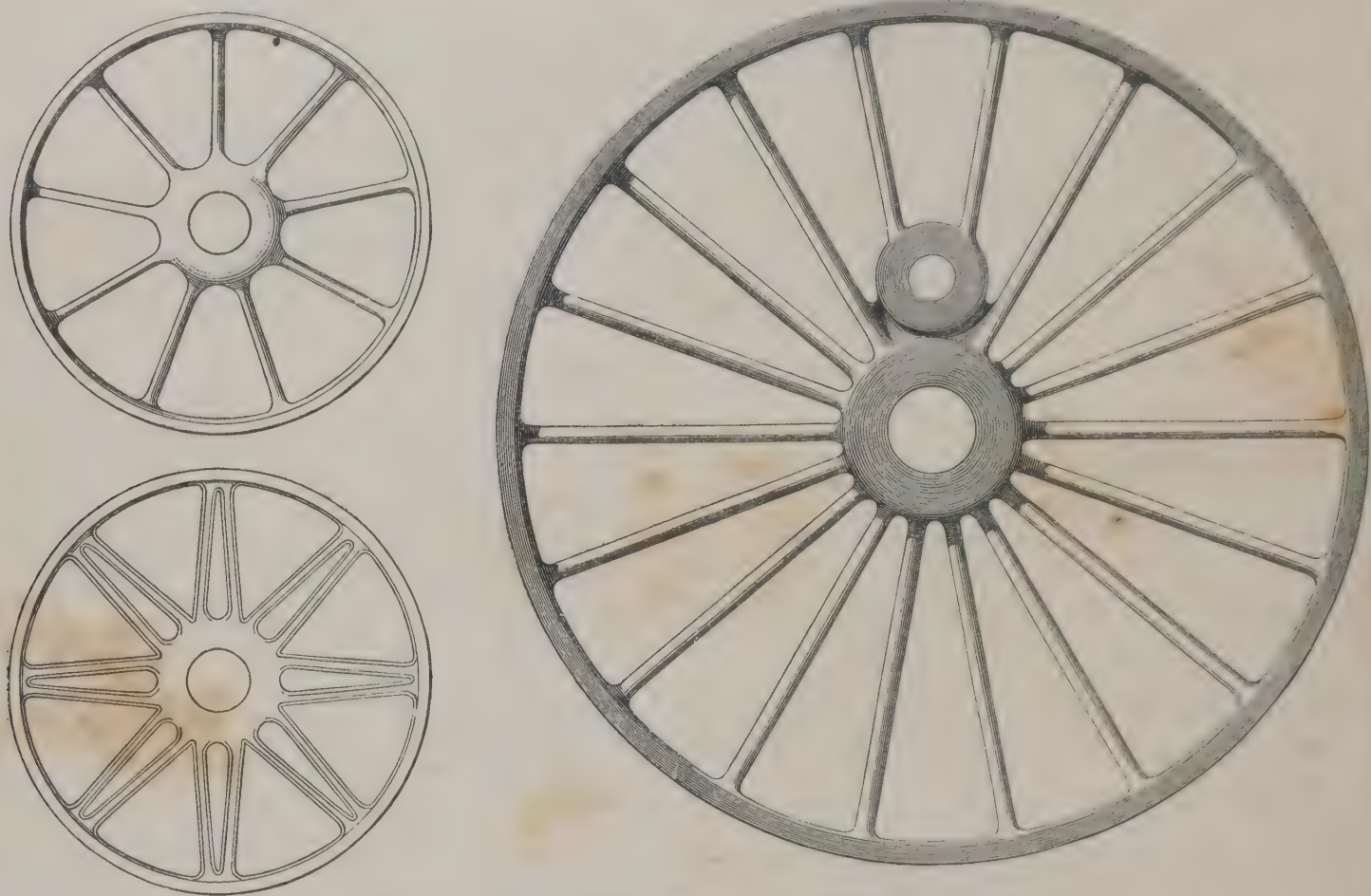
ORDISH & LE FEUVRE, 18 *Great George Street, Westminster*. — Ordish's patent elastic chairs and sleepers.

This system of fastening rails in chairs or sleepers is by utilizing the elastic power of the cast iron in the disposition of the metal for this purpose. The cast iron keys and jaws are provided with obtuse angled ratchets, and

when driven in, the jaws are sprung asunder, thus holding and securing the rail, as the keys cannot come out, or be driven out, without springing the jaws further asunder.

[1285]

OWEN, WILLIAM, *Phoenix Works, Rotherham*. — Wrought engine and carriage wheels, stamped; patent axles and solid tires.



ARBEL'S PATENT STAMPED SOLID WROUGHT-IRON WHEELS.

OWEN'S PATENT AXLES.

PATENT ROLLED.
SOLID WELDLESS TIRES.

PATENT STAMPED SOLID WROUGHT-IRON WHEELS. — The peculiar recommendation of these wheels is their process of manufacture, being made in one piece under an immensely powerful hammer, by which perfect solidity is insured; so much so, that on cutting any of these wheels to pieces in a lathe, no trace of welding can be discovered.

OWEN'S PATENT ROLLED SOLID WELDLESS TIRES. — These tires possess the following advantages: —

They are made from a solid mass into a circular form, so that no alteration of the structure takes place in bending.

The whole surface of the tire, when at a welding heat,

is subject to the action of the hammer—thus perfect soundness is necessarily obtained. After hammering, they are again heated to a welding heat, and afterwards rolled by patent machinery into a perfectly true ring, and thus welding is avoided, rendering breakage by that process impossible.

They are finished by the patent rolling process perfectly true to any dimensions required, and turning and boring is therefore unnecessary, and the external skin of the iron is preserved for wear, whilst the quality of the iron is greatly improved.

[1286]

PARSONS, P. M., 9 *Arthur Street West, London Bridge, London, E.C.* — Patent railway switch.

[1287]

PATENT SHAFT AND AXLETREE COMPANY, *Brunswick Iron Works, Wednesbury.*—Wheels, axles, tire iron, tire fastening. Models &c.

[1288]

PERMANENT WAY COMPANY, 26 *Great George Street, Westminster.*—Rail joints for railways; preserved timber for sleepers.

[1289]

PERRY, HENRY J., JUN., 3 *Greenwich Road, Greenwich.*—Working model of atmospheric railway.

[1290]

POOLEY, H. & SON, *Liverpool.*—Weighing apparatus. (*See pages 18 and 19.*)

[1291]

RANSOME & SIMS, *Ipswich.*—Station pumping engine and boiler, &c. (*See page 20.*)

[1292]

REAY & USHER, *South Hylton Forge, Sunderland.*—Locomotive crank axle of cast steel, engine and waggon axles.

[1293]

RESTELL, R., 144 *High Street, Croydon.*—Coupling and disconnecting apparatus for railway engines, carriages, &c.

[1294]

RICHARDSON (GEORGE) & CHATTAWAY (ELWIN), 1 *New Broad Street, London.*—Communication between guard and engineman. Railway break.

[1295]

RICHARDSON, ROBERT, 26 *Great George Street, Westminster.*—Railway switches, bolts, fishes, punched rails, and rail fastenings.

[1296]

SCOTT, SAMUEL THOMAS, 23 *Charterhouse Street, E.C.*—Models of patent safety couplings for railway carriages.

[1297]

SCOTT, U., 66 *Pratt Street, Camden Town.*—Patent shackles and fittings for carriages; and a method of tunnelling under rivers to give light and ventilation.

[1298]

SEATON, W., 44 *Albemarle Street.*—Safety saddle-rail. (*See page 21.*)

[1299]

SHARP, STEWART, & CO., *Atlas Works, Manchester.*—Goods engine fed by two of Giffard's injectors, and fire box arranged for burning coal.

[1300]

SIMONS, W., & CO., *London Works, Renfrew.*—Railway chairs, sleepers, and foundry castings.

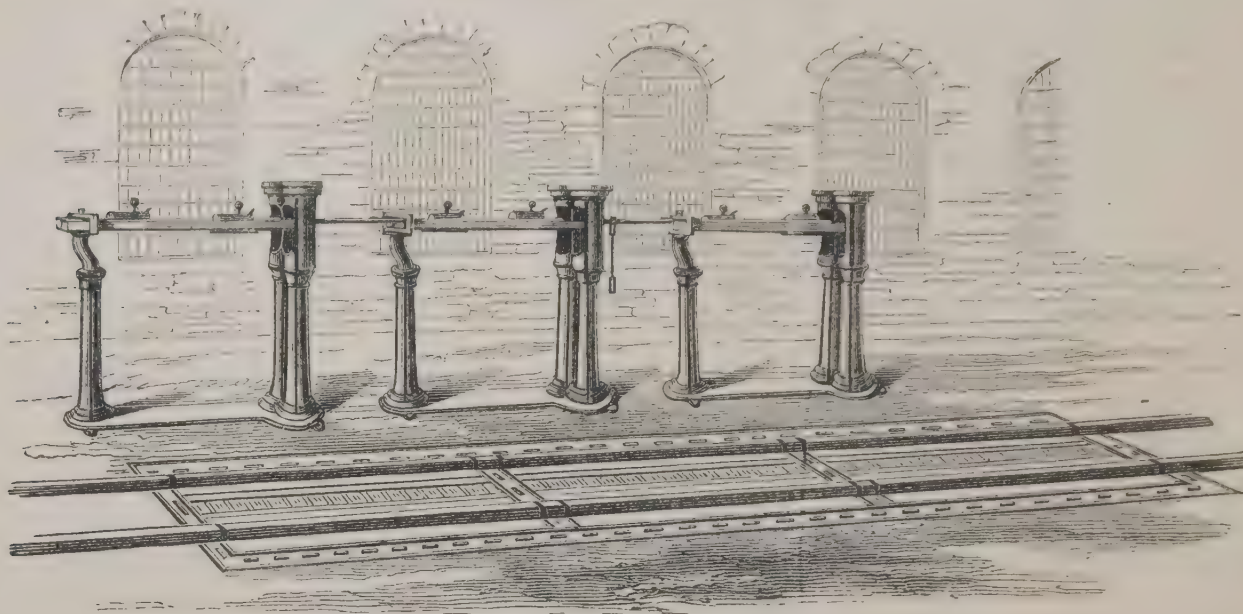
[1301]

SPENCER & SONS, *Newcastle-on-Tyne.*—Cast-steel tires, volute spring buffers, &c. (*See page 22.*)

[1302]

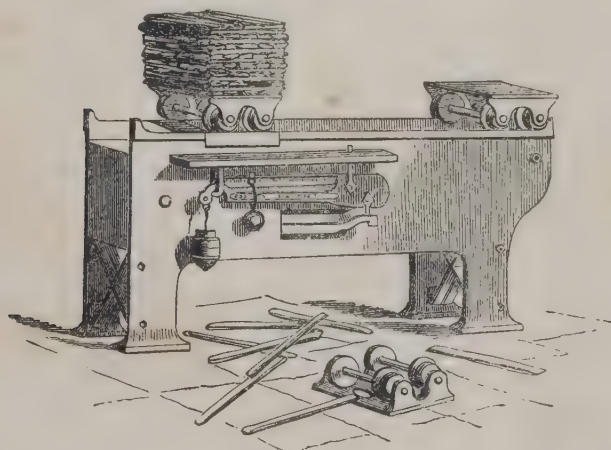
STEVENS & SON, *Darlington Works, Southwark.*—Semaphore signals. (*See page 23.*)

POOLEY, HENRY, & SON, *Liverpool*.—Railway, commercial, and mining weighing apparatus.
Obtained the Prize Medal in 1851.

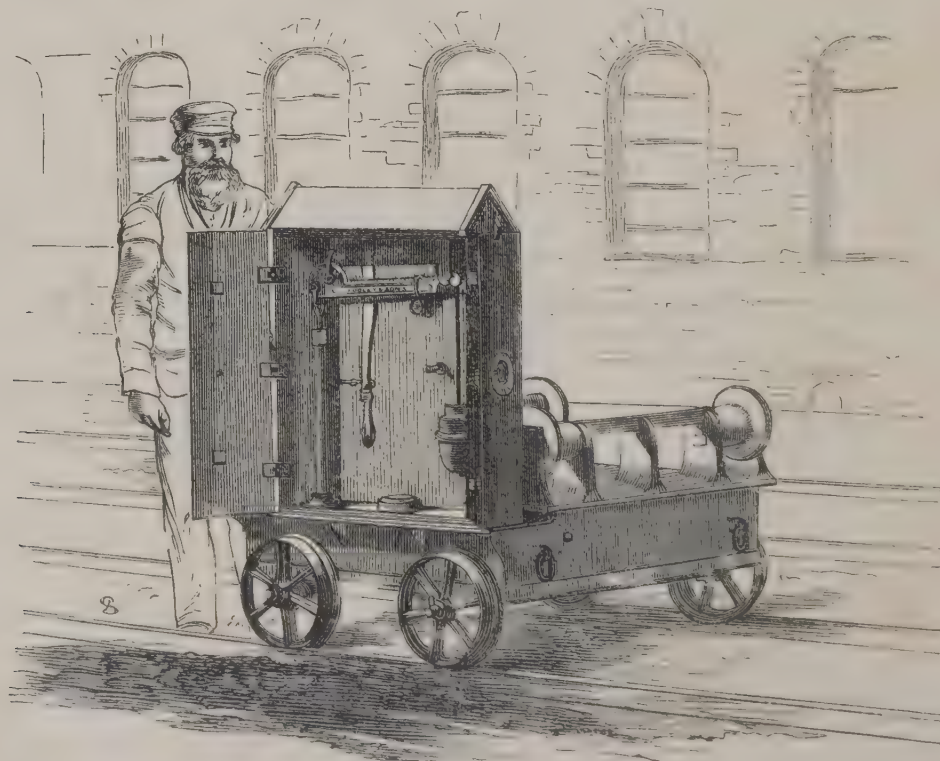


1. Set of Patent LOCOMOTIVE ENGINE WEIGHING TABLES, for weighing and balancing, or adjusting, engines; giving by one operation the total weight of the engine, and the weight imposed upon the rail by each wheel. Their

use is to enable the superintending engineer to adjust the springs of engines so as to obtain the greatest amount of tractive power that is consistent with immunity from danger of running off the line at curves.



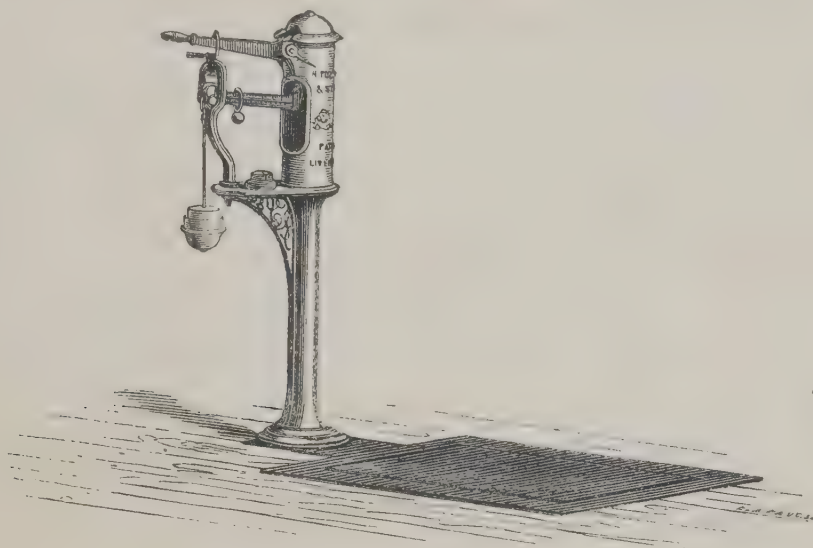
2. 'PILE' WEIGHING MACHINE. For rolling mills, and specially for rails. Its use will be obvious to any ironmaster. The 'Piles' are formed upon a small truck, standing upon the weighing portion of the frame next to the 'Piler.' When the amount of iron to make a rail of the required weight is piled upon the truck, it is pushed forward to the workman, to be transferred to the furnace, and thence to the rolls. By this machine, the great loss attending guess work in such operations is avoided."



3. MACHINES FOR ROLLING MILLS AND FORGES—The rollers facilitate the loading and unloading of heavy rails and forgings, the locked and enclosed pent-house preserves it from weather and pilferage when exposed on

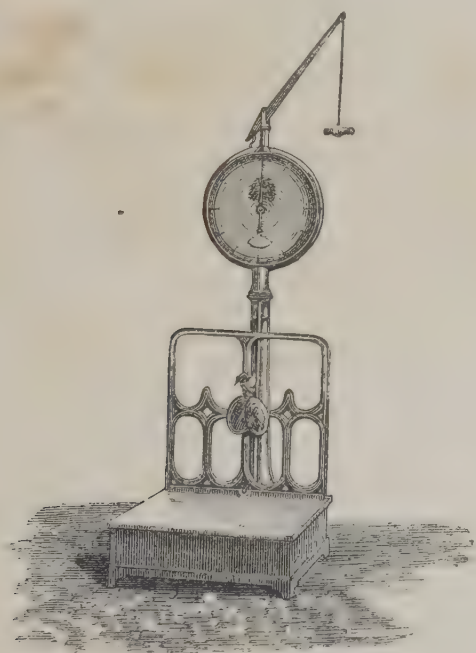
the public quay or yard. Two sets of labourers can be employed at once—one loading and the other unloading, avoiding all loss of time in waiting between the loads.

POOLEY, HENRY, & SON, *Liverpool.* — Weighing apparatus — *continued.*



4. THE RAILWAY GOODS WAREHOUSE MACHINE.— First introduced by Messrs. Pooley at the Liverpool and Manchester Railway, 1835; and as the specimen exhibited shows, now greatly improved in design, construction, and exactitude. It is 'dormant' except when put in gear by the man in charge. The weighing-table forms part of the floor, and encumbers no space. Its accuracy is

equal to the best scale-beam, whilst labour and cost are economised at least 50 per cent. It is only by means of these machines that the heavy merchandise traffic of railways could be despatched with adequate speed; it has, therefore, become the machine of the goods trade generally, not only for railways, but for general commerce.



5. THE PARCELS OFFICE MACHINE — combining the instantaneous self-acting indications of the spring dial machine with the strength and convenience of the platform weighing machine. The load to be weighed is simply deposited on the platform, when, on drawing down the lever by the suspended handle, the weight is seen at once upon the face of the dial.

6. THE PARCELS OFFICE MACHINE, for use upon the counter; very exact in its indications, but not so speedy as the dial. The low price, combined with great correctness, are its recommendations.

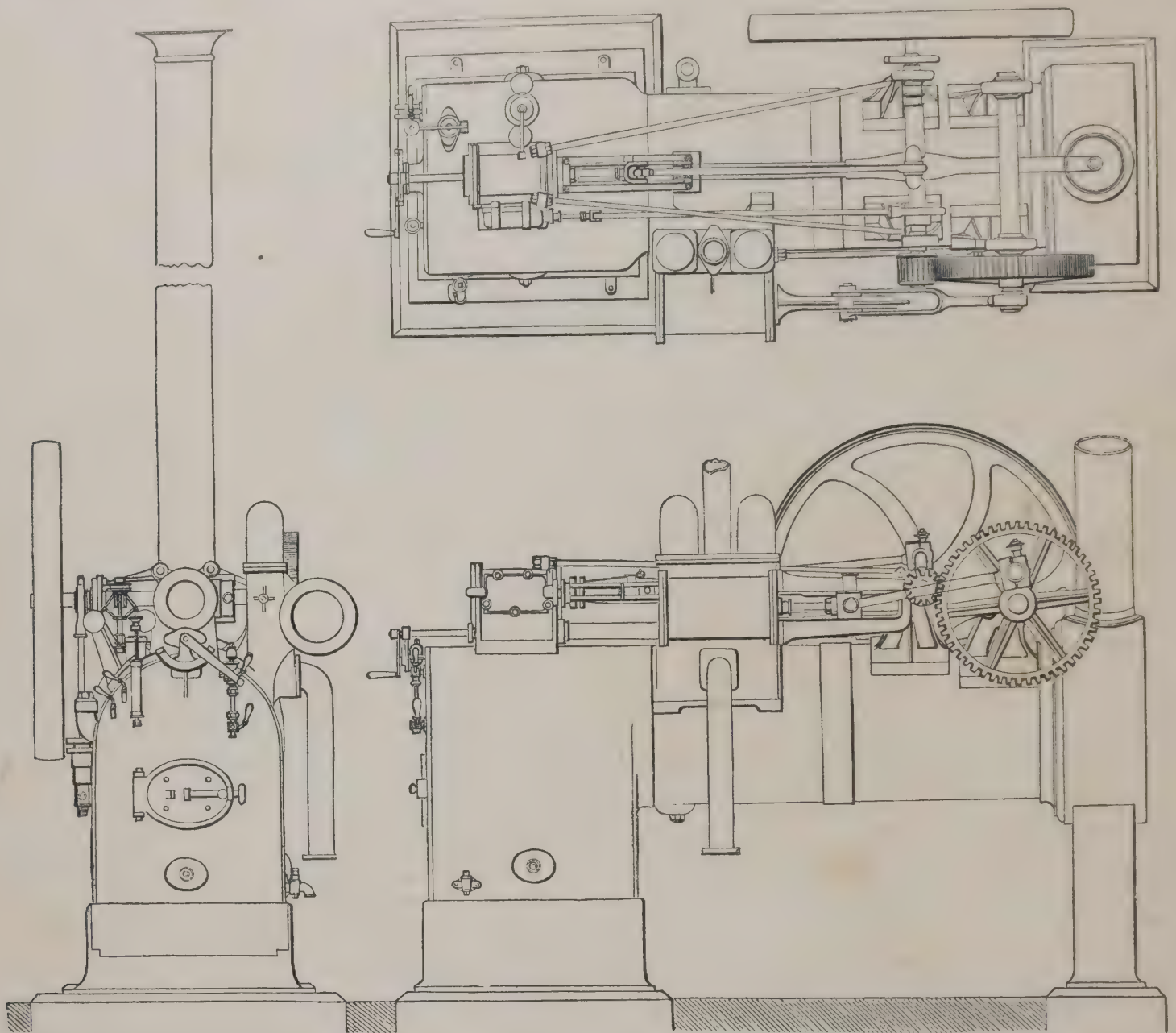
7. PASSENGERS' LUGGAGE MACHINE.—No railway station can be complete, and no company safe from fraud, without one.



8. THE CART WEIGH-BRIDGE is of the smallest size, but it exhibits the principle and construction adopted for vehicles of every form, and of every capacity used upon highways. The present example is specially fitted for

farmers' use; and, being cheap, very easily erected, without any masonry, and requiring no mechanic to erect or remove it from place to place, is well adapted for the farm.

RANSOMES & SIMS, Ipswich.—Combined steam station pumping engine and boiler; compressed railway fastenings; sundry castings.



A THREE-HORSE POWER PUMPING ENGINE.

This engine is especially applicable for filling water-tanks at railway stations, and such similar purposes. The pump and the engine are both mounted upon a multitubular (locomotive shape) boiler, which rests upon two cast iron pedestals, and requires no further fixing. This engine is capable of raising in 10 hours between 4,000 and 5,000 cubic feet of water, from a depth of 15 feet under the ground where it stands to a height not exceeding 100 feet above the same level. But the engine is equally adapted for any other work for which engines of its power are used.

The pump is lined with brass; the bucket packed with leather; the valves of india-rubber seated on brass, and so arranged that they can easily be taken out, two at a time, for inspection or renewal.

Weight—about 45 cwt.

Measurement—about 140 cubic feet.

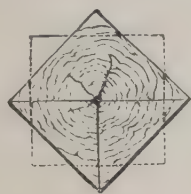
A SERIES OF COMPRESSED KEYS AND TRENAILS, for Railway and other purposes.

These fastenings are used very extensively on the English lines of railway, and have been almost entirely adopted

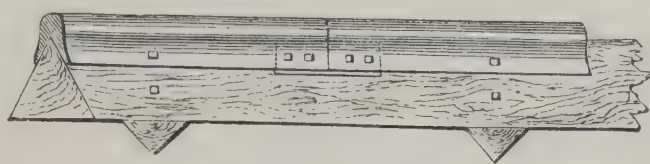
in laying the railways in India and Australia. They are made of the best wood, which is cut out much larger than the finished size, is very carefully desiccated, and then compressed by machinery. These fastenings fit the chairs and rails accurately; they last longer than uncompressed fastenings; and when driven into their places in the permanent way, they return, under the influence of rain and moisture, towards their original size before compression, thus completely filling the hole into which they are driven, and holding the rail firmly in its place in the chair, and the chair firmly to the sleeper. The permanent way of the Great Northern Railway is laid with these compressed keys and trenails, and the speed and comfort attained on it prove them to be an admirable fastening. RANSOMES & SIMS have a patent for injecting these fastenings with the vapour of creosote, which adds but little to the expense and greatly increases their durability.

A SAMPLE SERIES OF CASTINGS MADE BY UNSKILLED LABOUR—intended to show the perfection in production which may be obtained by the use of Patented Moulding Machinery.

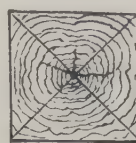
SEATON, WILLIAM, 44 *Albemarle Street, London.*—Patent safety saddle rail, longitudinal timbers for permanent way.



END VIEW
OF TIMBER.



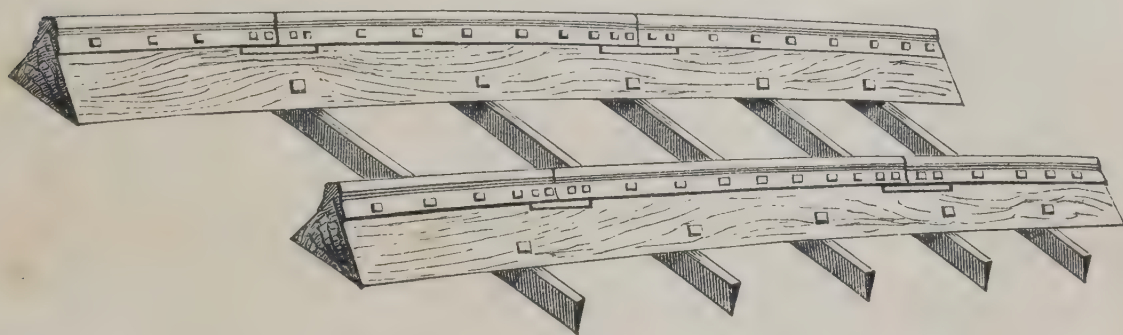
SIDE VIEW OF RAIL.



END VIEW
OF TIMBER.



TRANSVERSE SECTION.



PERMANENT WAY, CONTINUOUS BEARINGS.

The advantages attending the adoption of this system of Permanent Way, may be shortly stated as follows:—

1. The Rail is supported throughout by a solid and continuous bearing of timber, having a bearing surface on the ballast of 17 inches in width.

2. The Rail has a firm surface bearing on the timber of 288 inches per lineal yard, and the pressure being at right angles to the flange, it has a tendency to compress the fibre of the timber, rendering it firmer and harder in proportion to the pressure applied.

3. The Rail and Sleeper are liable to no decay or injury from rain and wet; the form, being pyramidal, has no surface on which water can lodge.

4. The mode of joining and supporting the ends of the rails, by an under saddle-plate, is found to be thoroughly effective, and much less costly than any existing mode.

5. This system requires no iron or other chairs; no keys, fish plates, pins, spikes, or trenails; or separate pieces, liable to become loose; its only fastenings are a few bolts on each side of the rail, there being no tendency in the rail to quit its seat, or to work loose.

6. In regard to economy, both of first cost and of subsequent maintenance, it far surpasses all existing systems, a fact which is due, as well to the saving of both timber and iron, as to the simplicity of its fastenings and their immovability.

7. To the latter circumstance, to the absence of chairs or other fastenings likely, by accident, to be brought into contact with the flanges of the wheels, and to the perfect mode of joining the rails, we may look for an entire absence of that class of dangerous accidents, so common of late, where the tire of a wheel has given way from a violent concussion, and has generally been attributed to unknown causes.

The merits of the system, then, may be summed up as follows:—

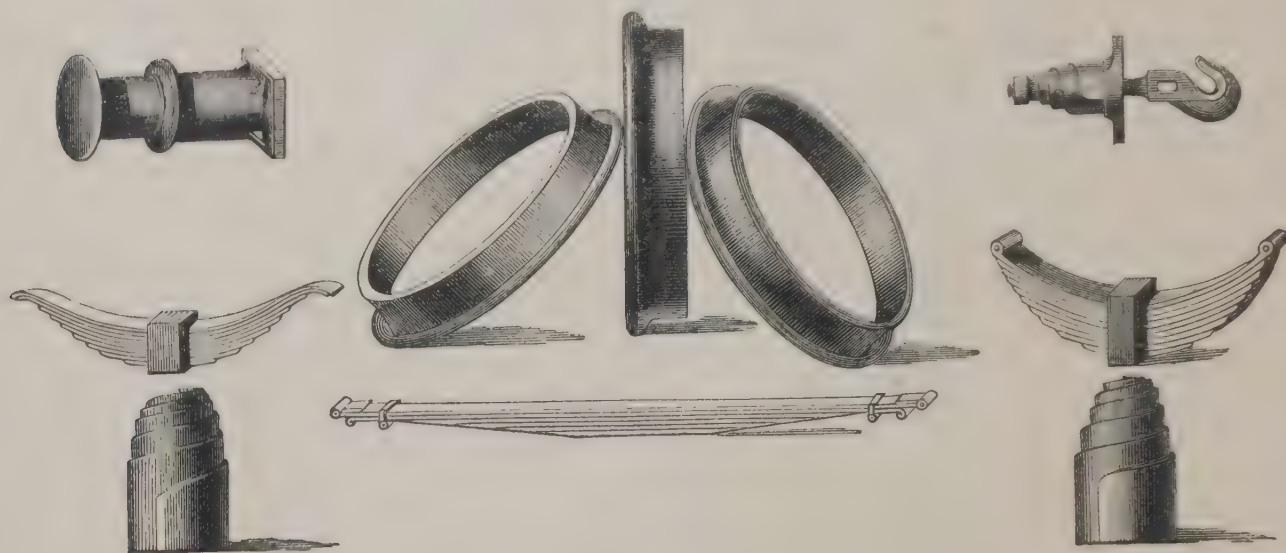
1. SIMPLICITY OF CONSTRUCTION.
2. SAFETY.
3. ECONOMY IN FIRST COST.
4. ECONOMY IN MAINTENANCE.

This system has been laid down for trial on several of the Main Lines of Railway, and has been amended from time to time, as improvements have suggested themselves. The portion of Railway which may be referred to as embodying the whole of these improvements, as affording the best illustration of the superiority of the system, and to which the foregoing description is in all respects applicable, is part of the Down Line of the Great Western Railway near Kensal Green, which was laid in May, 1858, over which the whole of the large traffic of that Company out of London has, in the interval, passed. At the present time (May, 1861), the ballast on that line has not been disturbed for twelve months; the grass is growing between the rails; and the fastenings are as firm and immovable as on the day when it was laid down.

Attention is requested to the testimony of ROBERT BENDON DOCKRAY, Esq., one of the earliest and most experienced Engineers in the kingdom, and who had, for eighteen years, under ROBERT STEPHENSON, Esq., the charge of the Maintenance of the Permanent Way of the London and North Western Railway. This extract is taken from a Report made by Mr. DOCKRAY to CAPTAIN MARTENDALE, R.E., one of the Government Inspectors of Railways, soon after the Road was first laid; and the note which follows it, and which has recently been obtained from Mr. DOCKRAY, records his opinion of the system after it has been under trial for three years.

Plans and Models of this system of Permanent Way can be inspected, and all information obtained at the Offices, 5, Parliament Street, Westminster; where, if desired, contracts will be entered into for its Construction and Maintenance for 7, 14, or 21 years, at rates varying from ten to fifteen per cent. lower than those of other systems.

SPENCER, JOHN, & SONS, 124 *Fenchurch Street, London, and 5 Westgate Street, Newcastle-on-Tyne.*—Cast steel tires, volute spring buffers, springs, steel and files.



JOHN SPENCER & SONS manufacture CAST STEEL, BLISTER STEEL, and SPRING STEEL, FILES of every description, HAMMERED CAST STEEL TIRES, RAILWAY CARRIAGE and ENGINE SPRINGS, and PATENT VOLUTE SPRING BUFFERS for stations, and rolling stock of all kinds.

1. CAST STEEL INGOT FOR A TIRE.
2. DITTO HAMMERED DITTO.
3. DITTO FINISHED ROLLED TIRE.
4. HAMMERED CAST STEEL SLIDE BAR.
5. DITTO PISTON ROD.
6. VOLUTE SPRING BUFFER, WITH WROUGHT IRON CASING.
7. DITTO, WITH WROUGHT IRON PLUNGER.
8. DITTO, WITH CAST IRON CASING.
9. SPENCER & CORLETT'S COMBINED PATENT VOLUTE BUFFER, WITH WROUGHT IRON PLUNGER AND HEAD.
10. DITTO, ENTIRELY WROUGHT IRON.
11. ALLEN'S PATENT COMPOUND VOLUTE BUFFER.
12. SPENCER'S PATENT RIBBED-END ENGINE BEARING SPRING.
13. CARRIAGE BUFFER SPRING.
14. CARRIAGE BEARING SPRING.
15. SPENCER'S PATENT RIBBED-END WAGGON BEARING SPRING.
16. SPECIMENS OF ADAMS' PATENT VARYING LOAD ABUTMENT SPRING.
17. SPECIMENS OF PLAIN AND RIBBED VOLUTE SPRINGS, AND OF THE ROLLED STEEL EMPLOYED IN THEIR MANUFACTURE.

The volute spring obtained the only prize awarded for springs at the Hyde Park International Exhibition of 1851. The construction has since been improved by adding ribs rolled upon the strip of steel to strengthen it, and keep the coils apart from each other, giving the spring more freedom of action.

STEVENS & SON, *Darlington Works, Southwark, S.E.*—Patent iron semaphore railway signals, and compensating signal wire apparatus.

1. PATENT WROUGHT IRON SEMAPHORE RAILWAY STATION SIGNAL, fitted with 8" lens lamp for oil, and improved apparatus, complete, ready for work.

One of these signals, when fixed at a railway station, acts for both the 'up' and 'down' lines for day and night. It is the most durable and effectual signal in use, and, although recently invented, it is already adopted on many of the lines in the United Kingdom, also in India, Australia, &c.; and, being made of open iron work, it is not acted on by the most violent gales; while the strong cast iron base renders it most secure and impervious to the decay to which timber signals are liable.

2. PATENT WROUGHT IRON DISTANT SIGNAL, fitted with Brydone's patent candle signal lamp and apparatus complete, ready for work.

These signals are fixed, in many instances, 1800 yards from the railway stations, and are worked at that distance with the greatest facility, and with no more difficulty or uncertainty of action, than at 100 yards from the station.

3. PATENT CAST IRON DISTANT SIGNAL.

These are made in cast iron, where only short signals are required; they possess all the advantages of the wrought iron signal, for heights not exceeding 20 ft., and are less in price.

4. PATENT COMPENSATING PULLOVER LEVER, with ratchet weight and chain complete.

These levers are for working the auxiliary signals at a distance from the station, the lever being fixed at the station, or on the junction platform. The advantage of these over the ordinary levers is, that by means of the ratchet balance weight and rack fitted to the lever, the expansion or contraction of the wire through the variation of temperature is compensated.

5. THE PATENT COMPENSATOR.

These are placed at intermediate points between the lever and the signal, in cases where wires of extraordinary length are required.

6. PATENT POINT INDICATOR.

These are fixed at railway stations, &c., where there are frequently a number of diverging lines. It is desirable to have an efficient apparatus to show when the shifting rail or point is open or shut. These indicators show most distinctly by day or night the state of the points. By day the disc divides, and by night the lamp placed at the back of, or between the disc or discs, shows a red, green, or white light.



[1303]

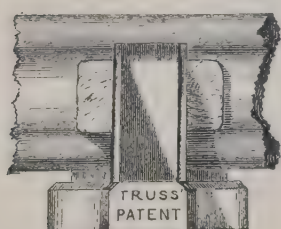
STRAFFORD, CAPT. P. P., *St. James's Square*.—Self-acting railway signal.

[1304]

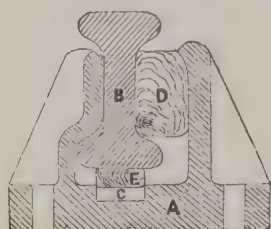
TIZARD, WILLIAM LITTELL, C.E., 12 *Mark Lane, London*.—A bolt and nut fastening washer for railway fish-plates, &c.

[1305]

TRUSS, THOMAS S., C.E., 53 *Gracechurch Street, London*.—Patent cushioned railway chair, and packing.



SIDE ELEVATION.



SECTION.

T. S. TRUSS, C.E., 53 *Gracechurch Street, London*, is the patentee and manufacturer of chemically prepared woollen packing for pipe joints, tanks, bed-plates, railway chairs, &c., &c.

By the application of this packing to railway chairs, the chair and the under head of the rail are entirely protected from friction.

The working head will last much longer, as the violent concussion caused by the train is absorbed by the packing, and thus the nature of the metal is preserved.

This packing is made of any required size, form, or thickness, and is rendered almost indestructible by the process through which it is passed.

Reference to the sectional drawing of railway chair: A, chair; B, rail; C, patent packing; D, wood key; E, wood seating.

[1306]

VICKERS, ARCHIBALD, *Bristol*.—Method of opening, shutting, and fastening four gates simultaneously, applicable to railway crossings.

The object of this invention is the prevention of accidents and loss of life at railway crossings. Some short time ago an accident occurred on the Midland railway, at Bristol, by which three young girls endangered their lives. At the adjourned inquest the gate-keeper deposed, that on the morning of the fatal occurrence he found it impossible

to close the gates, owing to the violence of the wind, which, in spite of his efforts, blew them open again after each attempt. Finding the gates unclosed, the unfortunate girls attempted to cross the line, and one of them was killed. The small model exhibited was designed and constructed during the adjournment of the inquest.

[1307]

WALKER, WILLIAM, 3 *Atholl Lane, Edinburgh*.—Invoice box and ticket-keeper, can be supplied by the inventor at £9 per 100.

[1308]

WESTON & GRICE, *Stour Valley Iron Works, West Bromwich*.—Bar iron and railway fastenings.

[1309]

WISE, F., 22 *Buckingham Street, Adelphi*.—Ramié's railway chairs. (*See page 25.*)

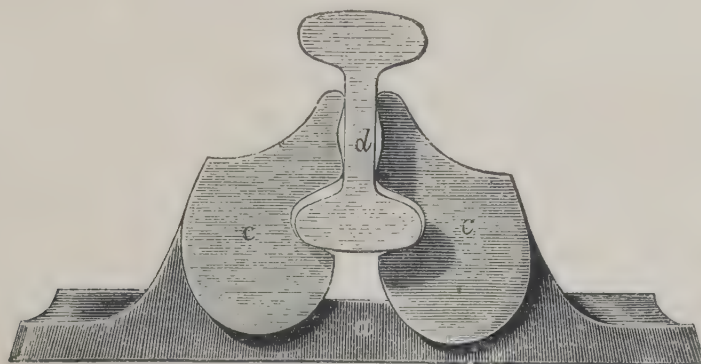
[1310]

WRIGHT, JOSEPH, & SONS, *Saltley Works, Birmingham*.—First-class carriage, constructed for the Egyptian Railway.

This carriage is constructed with framework of Moulmein teak, and panels of papier maché. It is provided with an upper roof, as a protection from the sun; the lower roof being fitted with lamps and movable ventilators. The interior is trimmed with light drab morocco; the windows in both doors and quarters are made to fall, and are fitted with Venetian sun-shades and spring curtains. Ventilators, to be

opened or closed at pleasure, are provided above the windows. The under-frame is of wrought iron of the most approved construction; and the carriage is mounted on solid wrought iron wheels, having Beattie's patent tire fastening. The axle-boxes are also Beattie's patent, to work either with oil or grease.

WISE, FRANCIS, C.E., 22 *Buckingham Street, Adelphi, London.*—Railway chairs without wedge or bolt (Ramié's patent).



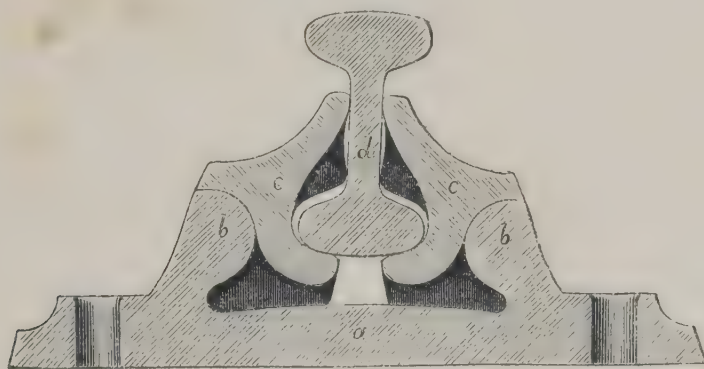
ELEVATION.

This chair (Ramié's patent) secures the rail without the employment of any wedge, bolt, or key, is self-tightening, and affords the greatest possible facility for placing, reversing, and removing the rail. Its action is such as to firmly secure and support the rail, maintaining its under head entirely uninjured, so that when reversed, instead of being 'chair-worn' into notches, as is the case where ordinary chairs are used, it is equal for working purposes to a new rail. It also avoids the evil which arises when a chair is so constructed that the under sides of the upper head of the rail rest upon rigid abutments, which, under traffic, act as anvils, between which, and passing wheels, the rail head is speedily hammered out.

It is well known that chairs of the ordinary kind, in which the rails are secured by wooden keys, are a constant source of trouble, annoyance, and expense, owing to the continual expansions and shrinkings of the keys, which, notwithstanding constant care and the employment of men along the line continually 'tightening up,' are rarely, if ever, in a condition to hold the rails in the chairs with

anything like firmness and solidity; and in very numerous instances (perhaps one-half), are so loose as to fall out with the slightest push, and are without any effect whatever in holding the rails.

The natural consequences of this defect, under traffic, are to cause a continual hammering of the rails upon the chairs, which very quickly produces deep indentations in the rails, and thereby converts their under-tables into a kind of rack or succession of notches, which, upon the inversion of the rails, constitute a sort of corduroy road, and act as an efficient agent in the rapid destruction of the rolling stock, and of annoyance to the passengers over it. In some cases more serious results occur—see case of *Taylor v. Manchester, Sheffield, and Lincolnshire Railway* ('Times,' March 20, 1862), where £400 damages were awarded to plaintiff for injuries received, owing to the carriage in which she was travelling, and other carriages of the train, leaving the line. In this case it was clearly shown in evidence, that the keys whereby the rails ought to have been held were scattered along the line, and the accident



SECTION.

was attributed to that cause. This is but one (and a comparatively unimportant instance) among a great number of cases in which accidents—some of them attended with terrible results to life and property—have arisen from carriages leaving the line; and is merely put forward as being so clearly and unmistakably traceable to the imperfection of the ordinary method of attempting to secure the rails in their chairs.

Ramié's chair consists of three parts, as will be seen on reference to the accompanying elevation and section. The main casting, *a*, is secured to the sleeper by spikes or trenails, in the ordinary manner, and is formed with curved abutments *b*, upon which rest the 'tumble' jaws *c*, which carry the rail *d*. The weight of the rail, pressing upon the lower parts of the jaws, causes their upper parts to close upon its web with a force which is amply sufficient to maintain it securely in position when not under traffic. On a train passing over, the amount of grip or force with which the rail is held is increased directly in proportion to the passing weight.

Should the sleeper carrying the chair become beaten down into the ballast below its proper level, attention is at once drawn to the fact by the upper parts of the jaws standing slightly away from the web of the rail. Although by this it is at once apparent, that the sleeper requires packing in order to keep the rail up to exactly its proper level, it does not in any way deteriorate from the security of the hold or grip upon it under traffic, as when the weight of a carriage comes upon the part, the rail is sprung downward until the jaws smoothly take their bearing, and grip firmly and solidly upon its web.

Ample play is allowed between the several parts of the chair, so that the accuracy of ordinary casting is quite sufficient to insure its efficiency.

Several years' experience of the working of this chair under the heaviest traffic, shows that it acts in the most perfect manner, and never allows chattering to occur between itself and the rail.

Further particulars may be obtained on application to Mr. FRANCIS WISE, C.E., as above.

[1311]

WRIGHT, PETER, *Constitution Hill Works, Dudley*.—Patent railway wheels and railway axles.

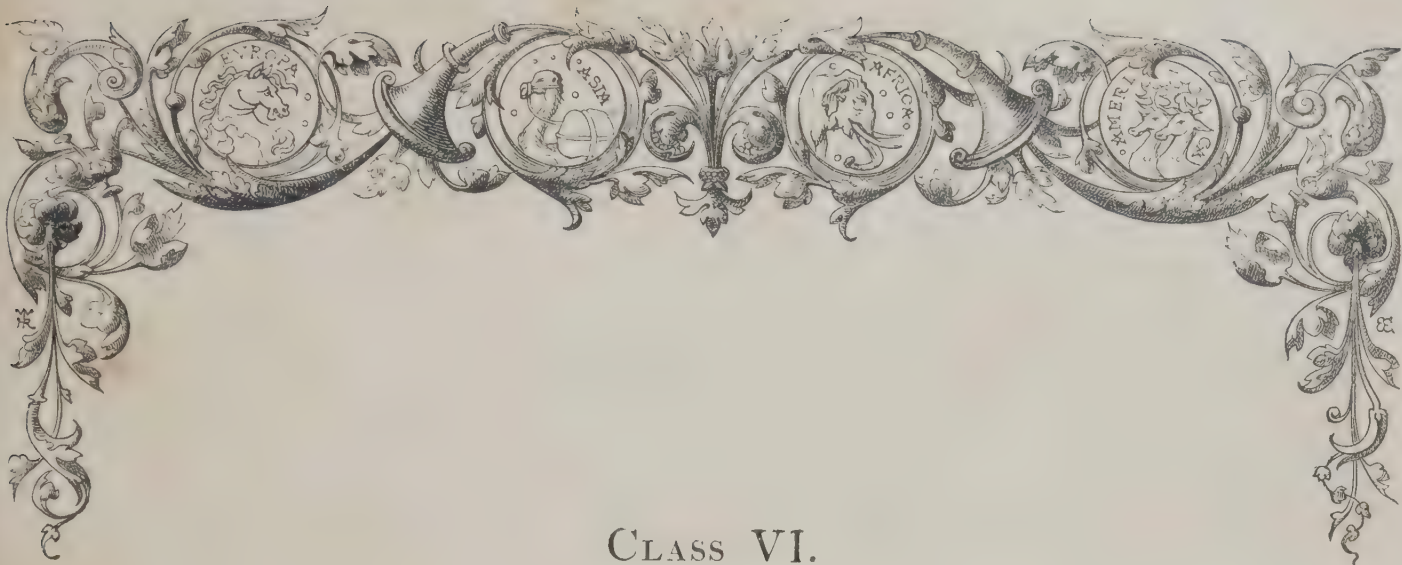
[1312]

WRIGHT, T., *George Yard, Lombard Street*.—Permanent way.

[1313]

FAIRBAIRN, GEORGE, *Manchester*.—Working model of a tank locomotive engine.





CLASS VI.

CARRIAGES NOT CONNECTED WITH RAIL OR TRAMROADS.

[1338]

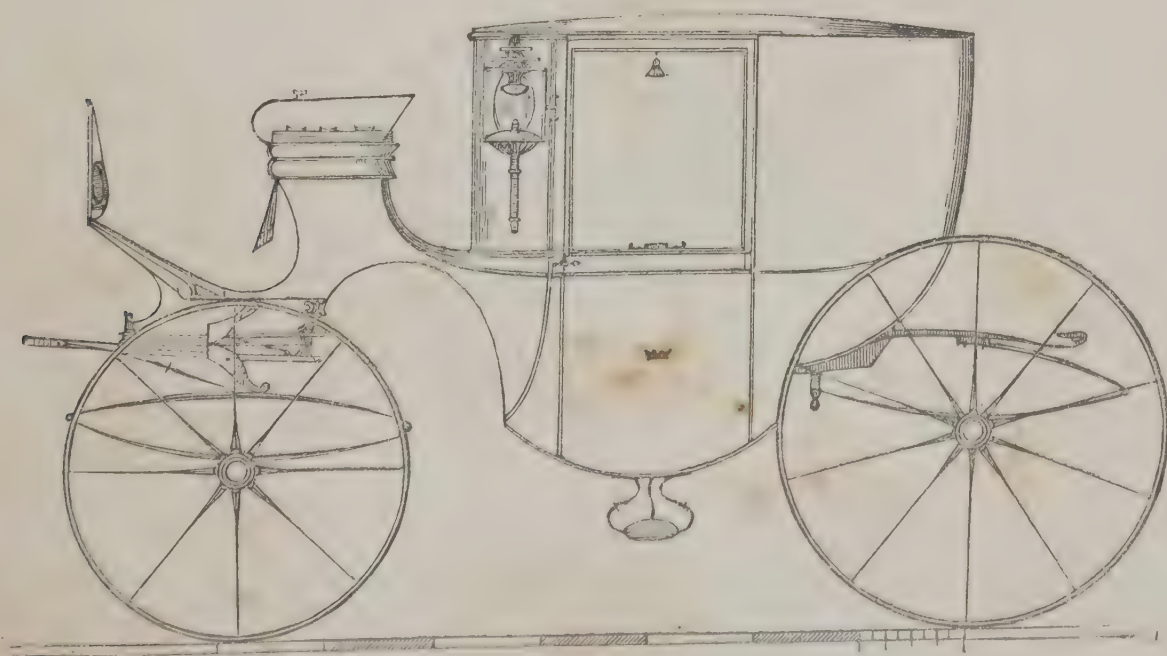
ALDEBERT, ISAAC, 57 *Long Acre*.—A barouche landau. (*See page 28.*)

[1339]

ANDREWS, ARTHUR, 14 *Above Bar, Southampton*.—Light and elegant 'Eugenie' park phaeton.

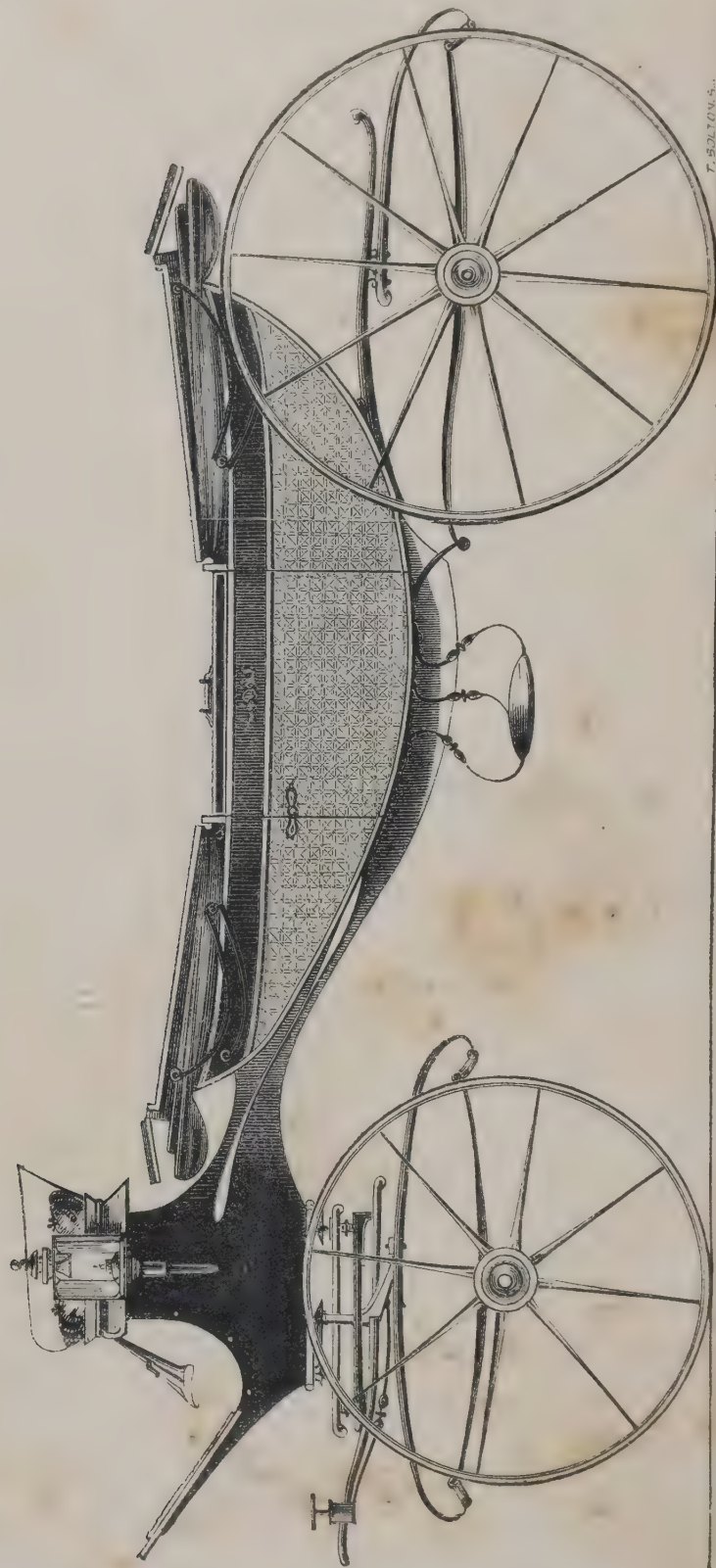
1340]

ANGUS, HENRY, *Newcastle-on-Tyne*.—A useful light one-horse double-seated brougham, with segmental front, and improved break.



ANGUS'S LIGHT BROUGHAM.

ALDEBERT, ISAAC, 57 *Long Acre*.—A barouche landau, constructed with steel instead of iron, and fitted with Aldebert's patent noiseless springs.



A BAROUCHE LANDAU.

A BAROUCHE LANDAU, constructed with steel instead of iron, the object of which is to obtain lightness, while the size of the carriage is not decreased. The wheels are made of foreign timber, so hard, tough, and durable that they can be worked much lighter than those ordinarily used. The body is hung on Aldebert's Patent Noiseless Springs, giving all the ease, comfort and quietude of C and under springs, without the additional expense or weight of perch carriages.

[1341]

BENNION & HEALEY, *Liverpool*.—Paragon brougham, circular front, roomy for four inside, high wheels, weight 8 cwt.

The peculiarity of the Paragon Brougham consists in the increased accommodation it affords, with greatly reduced weight and draught; and, in the employment for the springs and ironwork, of the Bessemer steel and iron,

which combine increased toughness and endurance, with reduced weight, and unusual lightness of appearance. There is also an opera board, which is readily convertible into a luggage platform when required.

[1342]

BLACK, H., & SON, *Berners Street, Oxford Street*.—A light C and under-spring coach.

[1343]

BOOKER & SONS, 13 and 14 *Mount Street, Grosvenor Square*.—A 'sociable.'

[1344]

BOYALL, RICHARD JOHN, *Grantham Carriage Manufactory*.—Park or road phaeton. (See page 30.)

[1345]

BRABY, JAMES, & SON, *Newington Causeway, Southwark*.—A spring waggon, with improved patent wheels and break.

[1346]

BRIGGS, GEORGE, & CO., 45 *Wigmore Street*.—A carriage.

[1347]

BURNETT, EDMUND, *Ashford, Kent*.—Gorilla cart, to form either cart or sleigh.

[1348]

BURTON, HENRY LESNEY, 12 *Nowell's Buildings, Liverpool Road, Islington, N. London*.
Perambulators and propellers.

[1349]

CAMPBELL, FREDERICK, Coach-BUILDER, *Dumfries*.—Sporting cart of Scotch elm varnished, adapted for dogs, luggage, or game.

[1350]

CAMPBELL, ROBERT 'FELIX, 8 *Brook Street, Gloucester Place, Hyde Park*.—Apparatus for the prevention of accident to carters, &c.

[1351]

CASE, C. J., 36 *Jamaica Street, Commercial Road East*.—Small model of an omnibus, made entirely of brass and steel.

[1352]

CHANTLER, JOHN DALE, *Ardwick Coach Works, Manchester*.—Light four-wheeled carriage.

[1353]

CLARKE BROTHERS, *Shiffnal, Salop*.—Patent tubular iron carriage shafts.

CLARKE BROTHERS are the patentees and manufacturers of tubular iron carriage shafts. CLARKE & TIMMINS, 10 Soho Square, W., their London agents, will supply all information as to prices, &c.

BOYALL, RICHARD JOHN, *Grantham Carriage Manufactory*.—Handsome park or road phaeton, hung upon inverted double C-springs, remarkably easy and very light.



A LADIES' DRIVING PHAETON, OR FOR A POSTILION TO RIDE AND DRIVE.

A Ladies' Driving Phaeton for park or road, with a seat for servant behind. It is hung on improved inverted double C-springs and leather braces, whereby it is rendered remarkably easy. It is fitted with Collinge's patent axles; is elegantly painted and trimmed, and finished with plated furniture and richly-ornamented lamps, in the highest style of decoration.

Besides the specimen carriage exhibited, the most

noticeable manufactures of this Exhibitor are, his Medium Brougham, which is at once roomy, comfortable, and light; his Grantham Sociable; and a variety of waggonettes and wicker carriages. In all of these, the designs and workmanship are of superior character.

References are permitted to many of the leading members of the aristocracy.

[1354]

COCKSHOOT, JOSEPH, Manufacturer, *New Bridge Street, Manchester*.—Medium-sized brougham, of lightest possible construction, combined with elegance and utility.

[1355]

COLE, W., Coach Builder, *Kensington*.—Brougham, C- and under-springs.

A C- and under-spring brougham, the body suspended with long leather braces, rendering it remarkably easy; supported by a crane-necked perch carriage, and patent axles. This carriage is made with every attention to elegance, lightness, and durability, combined with all improvements. It is lined with rich blue silk, the body

painted a fine claret, relieved with silver mountings, the carriage and wheels scarlet. It has handsome silver lamps, improved patent concealed hinges to the doors, and an improved step, combining the double advantage of an inside step for an invalid, if required. It is fitted with patent ventilators.

[1356]

COOK & HOLDWAY, 12 *Mount Street, Grosvenor Square*.—A sociable landau with an improved registered head.

[1357]

COOPER, BLACKFORD, & SON, 140 *Long Acre*.—Specimens of carriage laces and fancy trimmings.

[1358]

CORBEN & SON, 30, *Great Queen Street*.—A dioropha. (See page 32.)

[1359]

COUSINS, EDWARD, *Alfred Street, High Street, Oxford.*—A pony carriage.

[1360]

CROSS, T. W. & Co., *Hunslet Road, Leeds.*—Bath chair and perambulators.

[1361]

DART & SON, 12 *Bedford Street, Covent Garden.*—Coach lace.

[1362]

DAVIES & SON, 15 *Wigmore Street.*—Sociable landau, the panels partly in imitation of turned open sticks, concealed self-acting steps.

[1363]

DAVIES & SONS, Coach-Builders, *Northampton.*—A trotting phaeton.

DAVIES & SONS exhibit a Trotting Phaeton with movable hind seat, built and finished with materials and workmanship of the best description; Collinge's patent axles, with wrought boxes, and tough steel tires to wheels. Price 60 guineas.

A large assortment of Carriages is always on sale and building to order, at the manufactory.

Carriages built for exportation.

DAVIES & SONS' Dog-Carts are patronised by 500 gentlemen.

[1364]

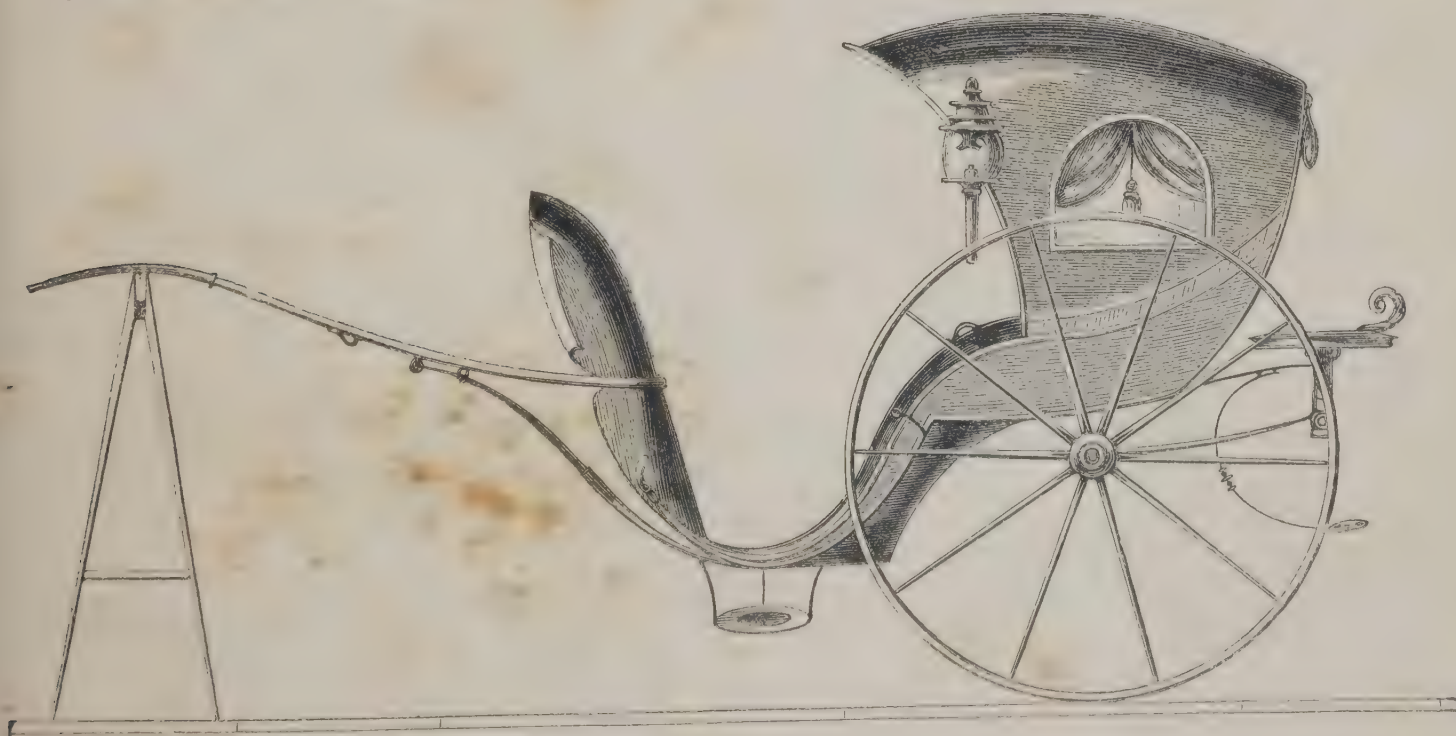
EDWARDS, SON, & CHAMBERLAYNE, 21 *Newman Street, W.*—A light fashionable four-wheel carriage, painted and lined green.

[1365]

ELL, GEORGE, & Co., *Euston Works, Euston Road, London.*—An improved van. (See page 33.)

[1366]

EVANS, JAMES, *Tarlton Street, Liverpool.*—An improved two-wheeled Hansom cab, secured by Royal Letters Patent.



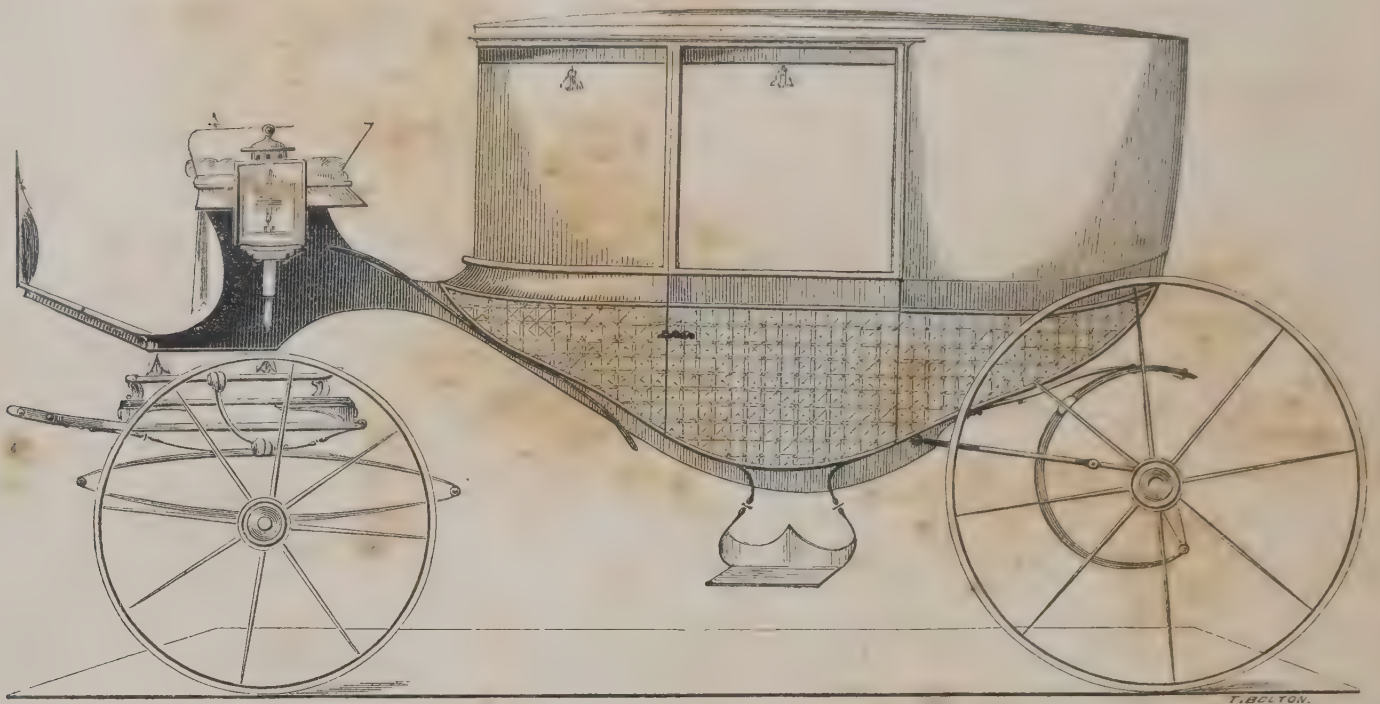
EVANS'S IMPROVED PATENT CAB.

The improvement consists in the application of metallic springs to the shafts near their junction with the front of the vehicle, thus securing a combined action which removes the unpleasant motion common to vehicles of the ordinary construction. Uneven and irregular roads produce no effect on the cab, as by means of the patent springs and joint an equal balance is preserved between

the vehicle and the shafts. The draught is considerably lightened (a very important feature). The patent includes several other improvements, an important one being the reduction of the weight of the vehicle, which weighs only 6 cwt.

The price of Evans's Improved Patent Cab varies according to style and finish. Prices will be forwarded on application.

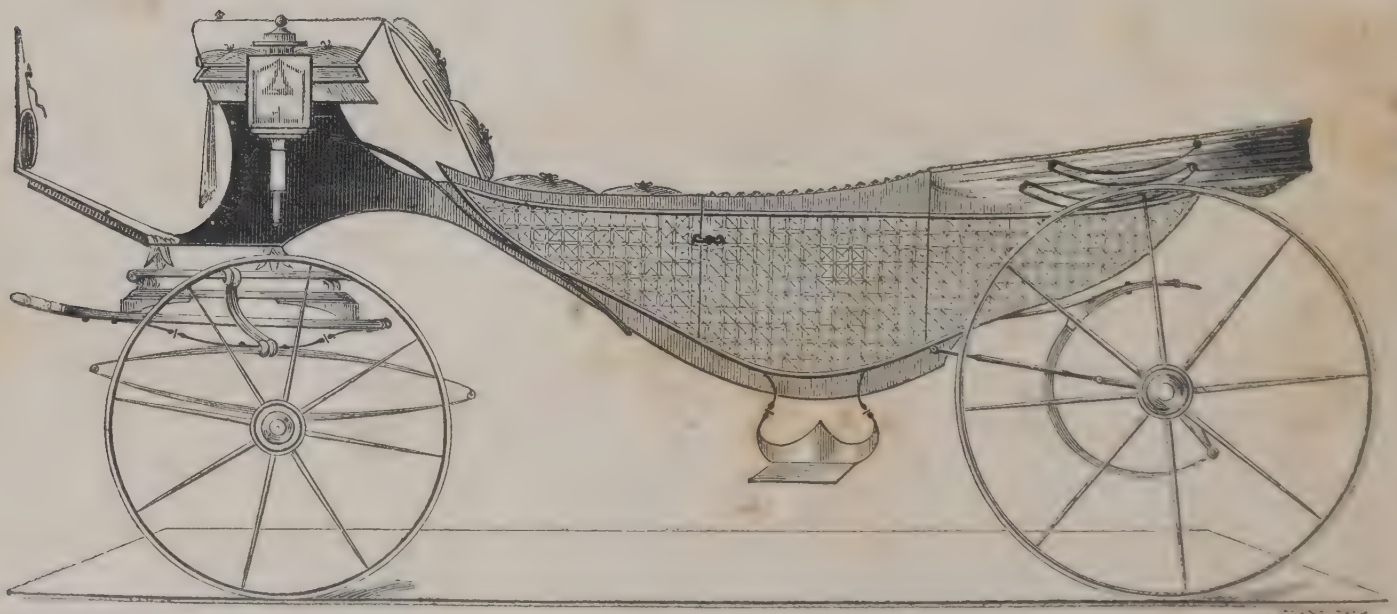
CORBEN & SONS, 30 Great Queen Street, London.—A dioropha carriage.



A DIOROPHA CARRIAGE.

The above engraving represents the Dioropha as a close carriage. The upper half is movable by the aid of a balance weight, cord, and pulleys attached to the coach-house ceiling; a folding or phaeton head is then fixed on, which, with the addition of folding flaps, makes it a perfect open carriage, as shown below. It is hung on CORBEN &

Sons' improved inverted C-springs and leather braces, which render it as easy as a carriage on the ordinary C-springs and heavy perch, and do not increase its weight beyond the usual elliptic spring carriages. This kind of spring has been found particularly advantageous, and can be applied to almost any carriage.



THE DIOROPHA AS AN OPEN CARRIAGE.

ELL, GEORGE, & Co., *Euston Works, Euston Road, London*, Wheelwrights.—An improved van for general purposes ; also models of heavy vehicles.

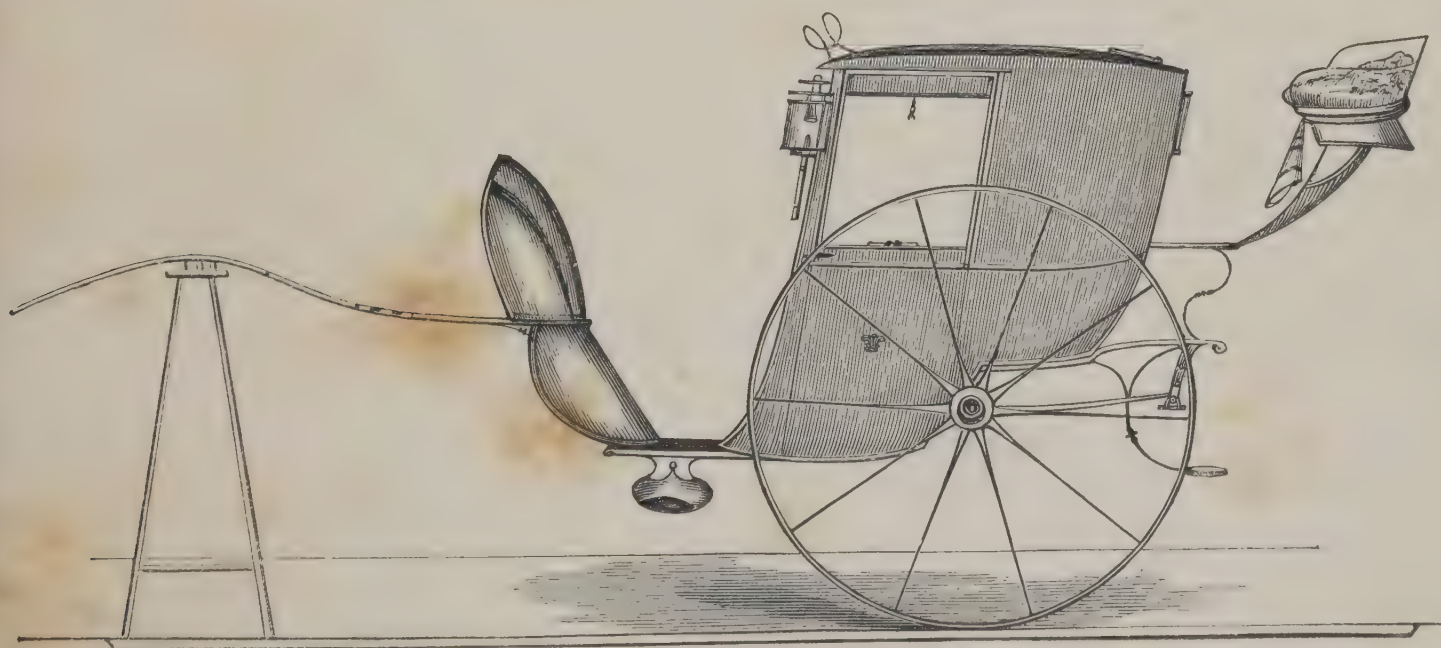
The following is a price list of the manufactures of these exhibitors :—

Improved Pillar and Standard Van, to carry 50 cwt., the same as the one exhibited	£40	0	to	£46	0		Plank-sided ditto	£	9	0	to	£10	0
Ditto, to carry 4 tons	48	0			54	0	Agricultural Cart	11	0			18	0
Builder's Van, to carry 2 to 5 tons	40	0			60	0	Agricultural Waggon	30	0			40	0
Corn or Flour Van, to carry 2 to 4 tons	40	0			55	0	Light Spring Cart	16	0			26	0
Railway or Carrier's Van, to carry 2 to 6 tons	36	0			60	0	Joiner's Cart, to carry 30 cwt.	26	0			28	0
Furniture Van, complete	45	0			55	0	Saw Mills Cart	27	0			30	0
Stone Truck, to carry 6 to 10 tons	35	0			50	0	Corn or Wine Cart	24	0			28	0
Timber Carriage, to carry 3 to 8 tons	28	0			45	0	Improved Crank-Axle Stone or Slate Cart	32	0			36	0
Two-horse Brick Cart, to carry 1000 bricks	20	0			30	0	Improved dray	25	0			45	0
One-horse Brick Cart, to carry 500 to 600 bricks	13	0			21	0	Improved Mortar Cart, with iron body	25	0			32	0
Standard Dobbin Cart	9	10			10	10	Improved Cattle Conveyance	34	0			40	0
							Builders' Hand-Carts.	5	10			10	0

Trollies, Earth Waggon and Whims; Brickmakers',
Excavators', Gardeners', and every description of Barrows;
also, Ladders, Trestles, and Steps.

[1367]

FELTON, W. J. & C., 2 *Halkin Place, Belgrave Square*.—New brougham 'shofle,' comfort and lightness of brougham and cab united.



FELTON'S NEW BROUGHAM 'SHOFLE.'

[1368]

FINDLATER, WILLIAM, Coach-BUILDER, *Gas Street, Broad Street, Birmingham*.—Light brougham for one or two horses.

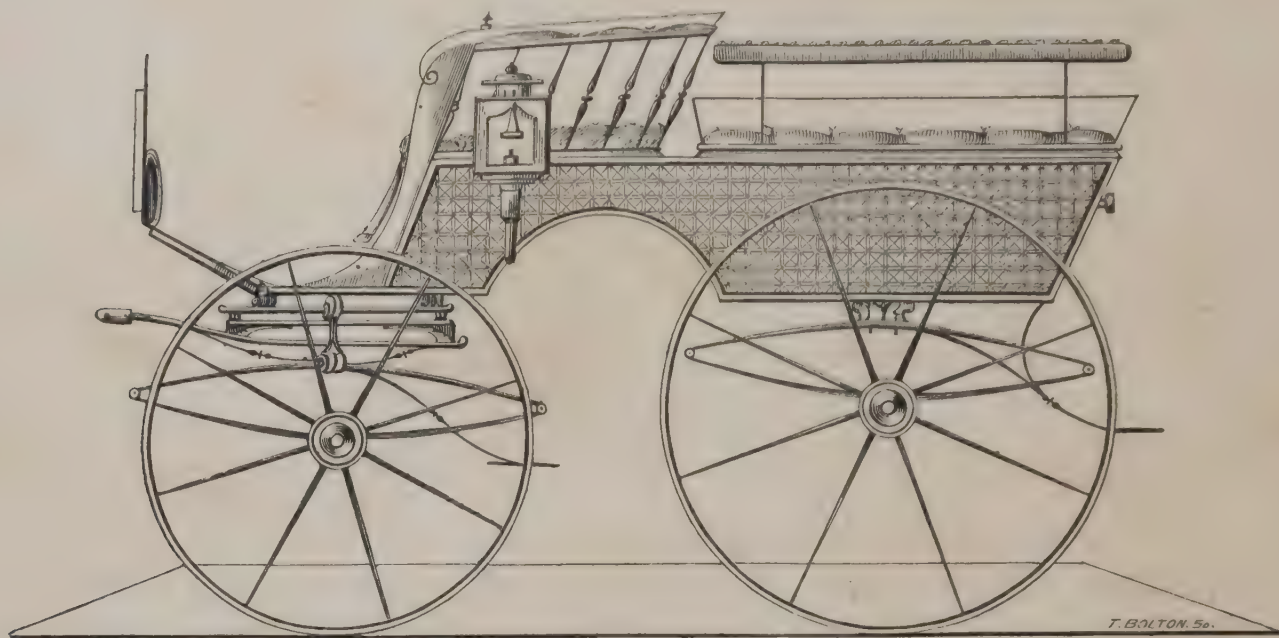
[1369]

FULLER, J. & SONS, *College Street, Bristol*.—Stanhope phaeton waggonette. (*See page 34.*)

[1370]

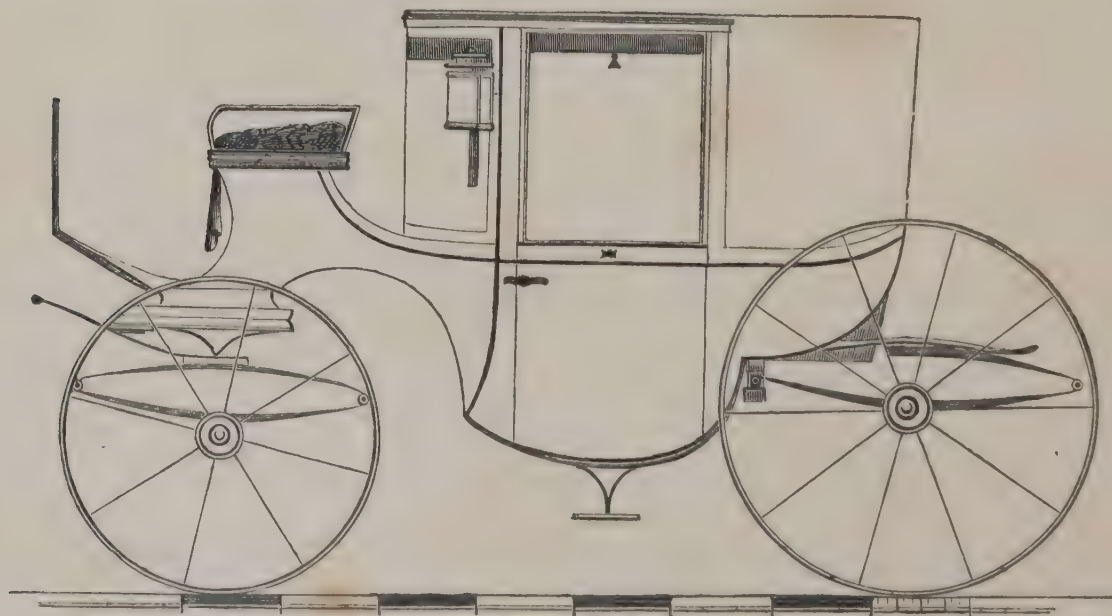
FULLER, S. & A., *Kingsmead Street, Bath*.—Brougham weighing under 7 cwt. (*See page 34.*)

FULLER, J., & SONS, *Limekiln Lane, and College Street, Bristol.*—Stanhope phaeton waggonette, with screw break.



STANHOPE PHAETON WAGGONETTE WITH SCREW BREAK.

FULLER, S. & A., *Kingsmead Street, Bath.*—The lightest brougham made; with improvements, combining strength and durability.



A FASHIONABLE BROUGHAM.

A fashionable Brougham upon the lightest possible construction consistent with strength and durability, and including all the latest improvements.

The weight of this Brougham is under 7 cwt.
S. & A. FULLER, Manufactory and Show Rooms, Kingsmead Street, Bath.

[1371]

GITTINS, RICHARD, 28 *New Street, Dorset Square, London.*—New axletree, applicable to all kinds of carriages.

[1372]

GLOVER, JAMES THOMAS, *East Gate, Warwick.*—A light waggonette.

[1373]

HADLEY, C., 37 *Lower Hurst Street, Birmingham.*—Omnibuses, cabs, &c. (*See page 36.*)

[1374]

HALE, S. W., Manufacturer, 27 *Park Lane, Piccadilly.*—Elcho sociable, adapted for one or two horses.

[1375]

HALL & SONS, 98 *Long Acre.*—Barouche on elliptic springs. (*See page 37.*)

[1376]

HARVEY, JOSEPH, *Heron House, Richmond, Surrey.*—A patent two-wheel closed carriage.

[1377]

HAWKINS, JOSEPH, *Hatfield Street, Blackfriars Road.*—Arms, axletrees, and spring for all common road vehicles.

[1378]

HAZELDINE, GEORGE, 5 *Lant Street, Borough.*—Patent road van.

[1379]

HIGGINSON, CHARLES, Jun., 65 *George Street, Portman Square, W.*—Carriage heraldry.

[1380]

HIGGINSON, CHARLES, Sen., 15 *Henrietta Street, Manchester Square, W.*—Heraldic painting for carriages.

[1381]

HOLMES, H. & A., *Derby, Lichfield, and London.*—Park sociable, with improved landau head, upon C- and under-springs.

[1382]

HOLROYD, NOBLE, & COLLIER, *Halifax.*—Patent machine-made wheels; imitation wicker panelling; carved wood mouldings.

[1383]

HOOPER & Co., 28, *Haymarket.*—Sefton landau, &c. (*See pages 38 to 40.*)

[1384]

HORSLEY, CHARLES, & SON, *Beccles.*—A light brougham.

[1385]

HOULGATE, FREDERICK, Carriage and Harness Manufacturer, *Scarborough.*—Handsome full-sized circular-fronted brougham. (*See page 36.*)

[1386]

HOWITT, W. J., 25 *Denmark Place, Soho*; and 52 *Parker Street, Drury Lane.*—C-springs and coach-smith work.

[1387]

HUTLEY, FREDERICK, 11 *Long Acre.*—New patterns in carriage laces.

[1388]

HUTTON, JOHN, & SONS, *Dublin.*—A round-fronted brougham; a very light Irish car.

HADLEY, CHARLES, *Lower Hurst Street, Birmingham.*—Single, double, and triple-bodied omnibuses, cabs, broughams, carts, waggons, hearses, &c.

Adding a forebody, A 1, in front of the present omnibus, brougham, and hearse bodies, A; lowering it to within a foot of the ground, avoiding steps; with hinged bottom; immured crank, and dwarf axles; also forming other separate bodies or recesses, B, or C, under, alongside, or upon it, all enclosed, and readily accessible by females.

Double-bodied saloon broughams and cars, seating six.
Brougham hearses, for mourners, bearers, and coffin.

Circular-fronted cab Broughams.

Circular wide-bodied Hansom cabs, seating three inside.

Double-bodied Hansom cabs, for three in and two out.

Double-bodied Hansom dog-cart cabs; seat five.

Hansom-cab hearses, for mourners, bearers, and coffin.

Widened beast transit carts, to carry two oxen abreast.

Watering carts, low and deep, on springs; high wheels.

Single bodied carts, lower and wider; higher wheels.

Lorry waggons, low, wide; openings to load each side.
Double bodied brewery, carrier, and other waggons.
Double bodied farmers' traps; for stock and produce.
Double bodied carriers', brewery, and other carts.
Double-bodied scavengering and watering carts; to convey refuse, and water the roads simultaneously.

Scavenger and night-soil carts, to separate the liquid from the solid portions, to utilise labour, time, and cost.

Traction, transit, fire and power waggons, with portable engine combined, to propel itself: applicable also to other uses.

Boat waggons; for removing night soil from towns.

Vibrating flanged wheels, for rail, groove, or flat ways.

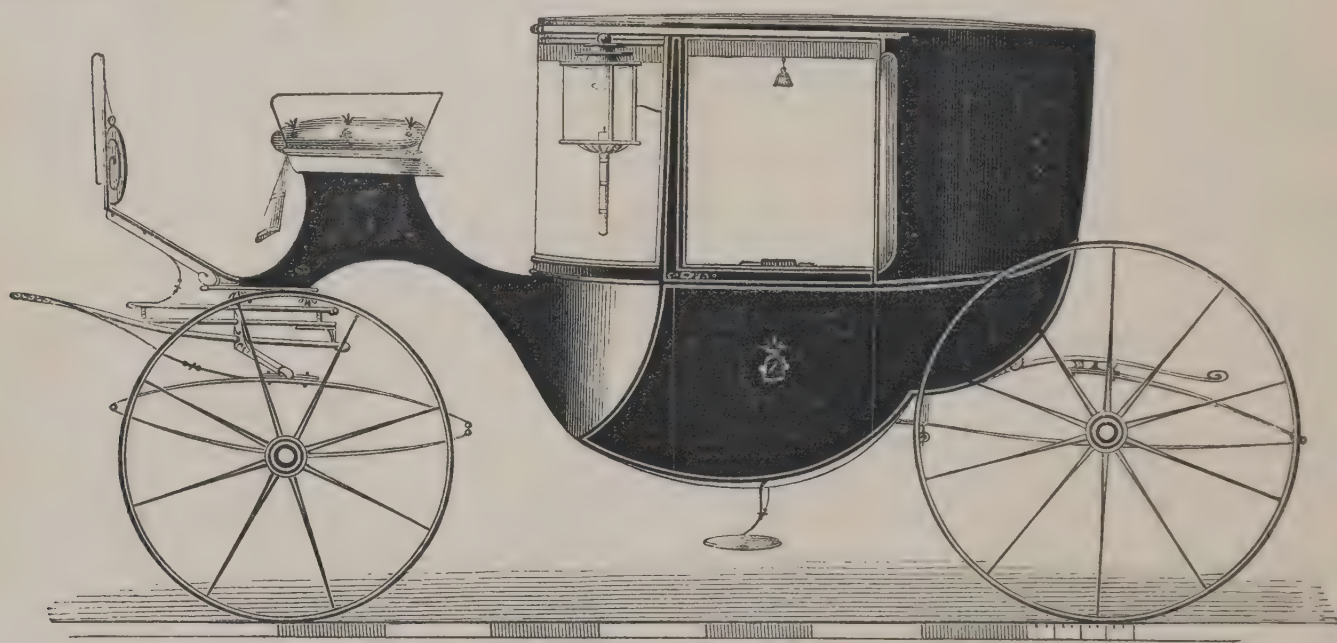
Metallic 'stepped,' and doubly secured axle box naves.

Stepped axles, to secure the nave at either end.

Cranked, dwarf, jib, sinuous, and expanding axles.

Breaks, to gain power down, for aiding up hill.

HOULGATE, FREDERICK, Carriage and Harness Manufacturer, *Scarborough.*—Handsome full-sized circular-fronted brougham.



HANDSOME FULL-SIZED CIRCULAR-FRONTED BROUGHAM.

The weight of the Brougham exhibited is $8\frac{1}{2}$ cwt., price £135. Pole and splinter bar for a pair of horses, 5 guineas extra.

ranging in price from £100 upwards. He can also supply on the most reasonable terms, and at the shortest notice, Hinge Yorkshire Sporting Carts, Malvern Dog-Carts, and carriages of every description.

F. HOULGATE manufactures miniature broughams,

[1389]

IVALL & LARGE, 56 *South Audley Street*, and 125 *Piccadilly.*—Four-in-hand coach, with patent drag.

[1390]

JONES, WALTER, 70 *Upper Seymour Street*, London, N.W.—Paintings for carriage decoration.

[1391]

KESTERTON, E., 94 *Long Acre.*—The 'Amempton' carriage. (See page 41.)

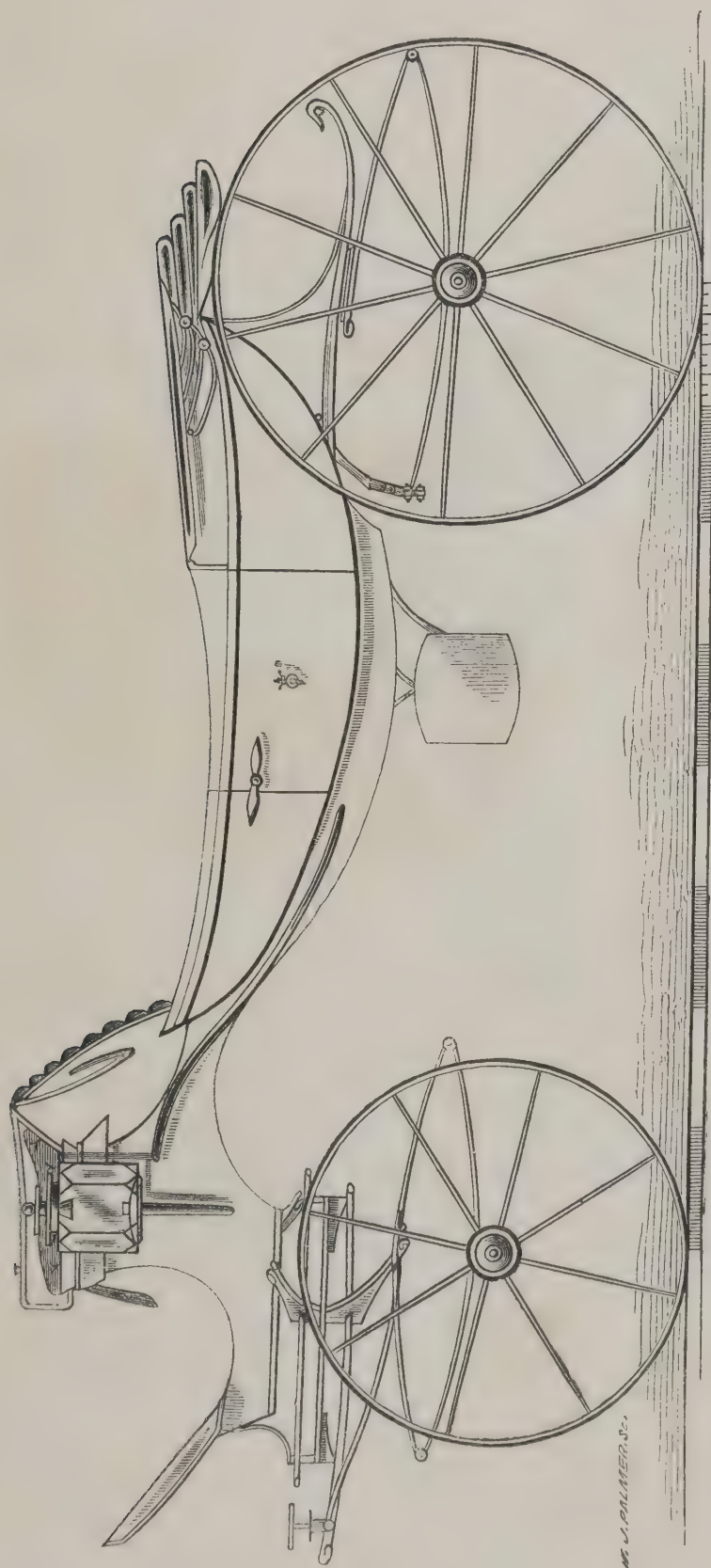
[1392]

KINROSS, WILLIAM, Coach-builder, *Stirling.*—A two-wheel buggy, with hood to cover two persons.

[1393]

LARKINS, STEPHEN N., 6 *Limekiln Street*, Dover.—Propelling bathing machine.

HALL & SONS, 97 and 98 *Long Acre*.—A barouche on elliptic springs, unusually easy and noiseless, and with self-acting body steps.



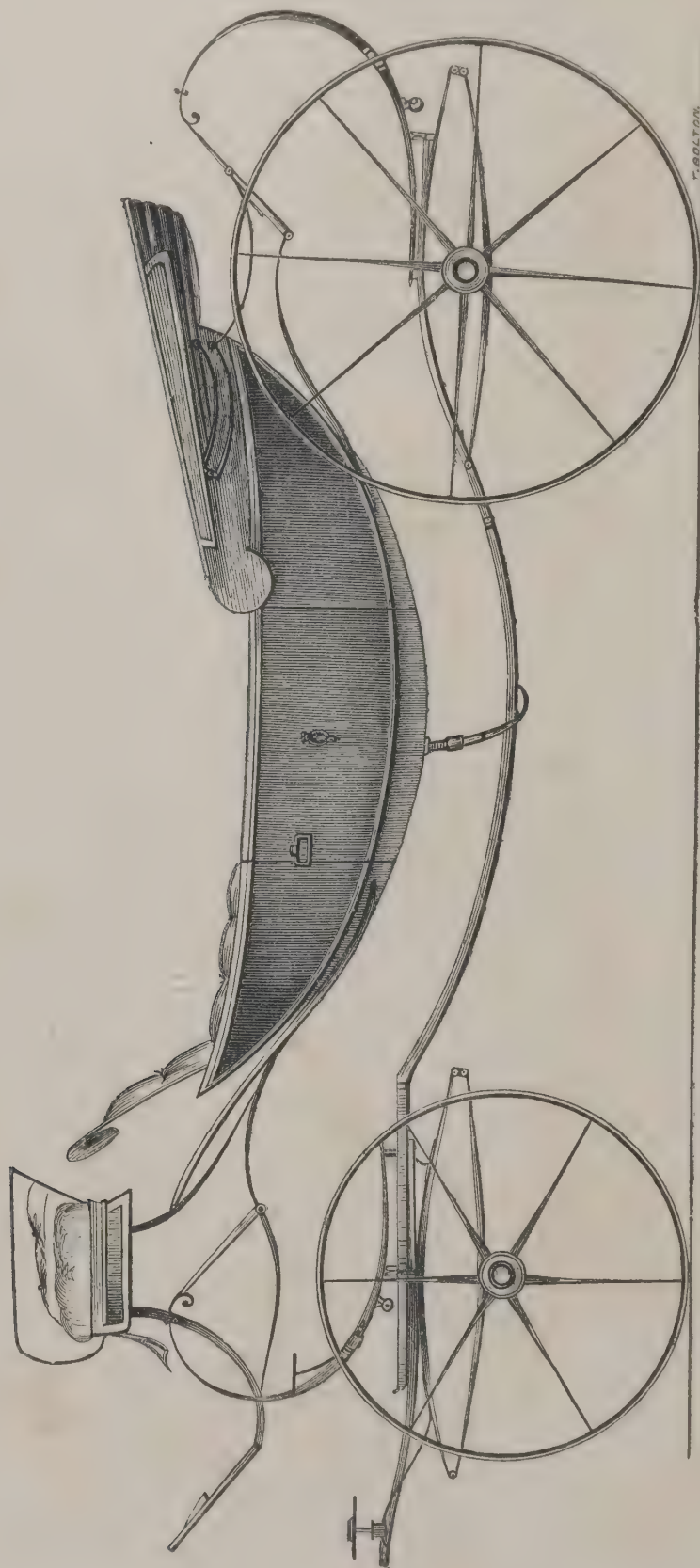
A BAROUCHE ON ELLIPTIC SPRINGS.

The above is a very handsome shaped Barouche, with self-acting steps, and hung on unusually easy springs. It embraces the twofold advantage of being a most roomy and commodious carriage, whilst at the same time it is so light in draught and construction, that the usual

'Brougham-sized horses' are more than equal to it. The painting is a rich lake picked out with carmine. The mountings are of silver. The lining is blue cloth and morocco, trimmed with handsome broad silk lace.

HOOPER & Co., 28 Haymarket, London, S.W.—A light 'Sefton' landau, with improved flat-falling head; an improved light 'Craven' barouche, on C- and under-springs.

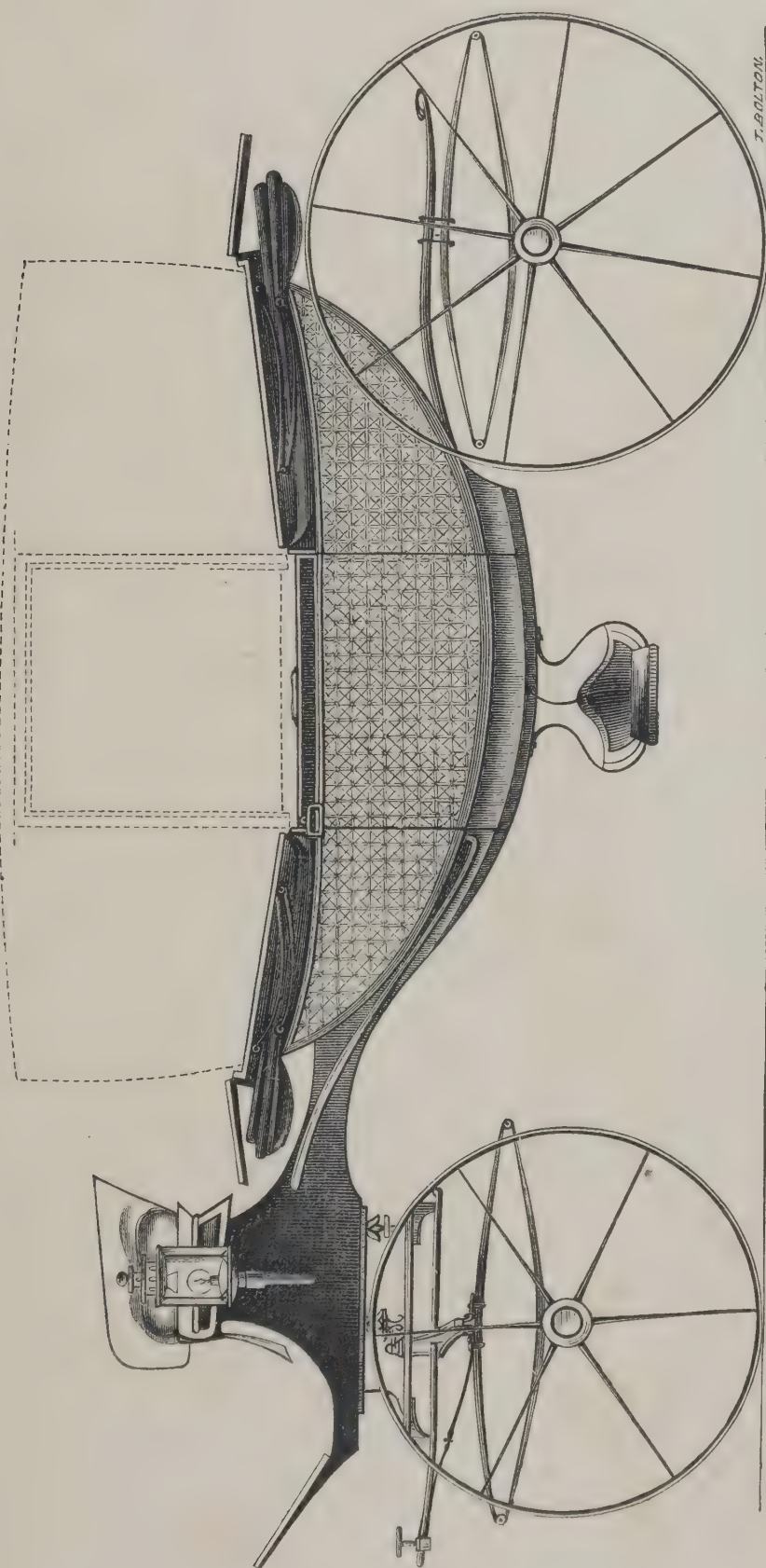
Obtained Prize Medal of the Great Exhibition of 1851.



A LIGHT AND ELEGANT 'CRAVEN' BAROUCHE.

HOOPER & Co., Her Majesty's Coach Builders, exhibit 1. A light and elegant 'Craven' Barouche, hung on under and C-springs, with a perch of improved construction, made of wood so connected with iron by rivets and hammered edges, as to act on the principle of a tube with a wooden centre, combining lightness with greatly increased strength and safety. By the construction of the body, the commodious folding steps are so placed as not to be seen above the panels, thus enabling the latter to be made of a more than usually light and elegant form. It is also

suspended at such a distance from the ground as to protect the occupants from the dust of the road. By the improvements introduced in the general construction of the individual and combined parts, and by the use of very tough steel instead of iron where practicable, the utmost strength with the minimum of weight is obtained. The carriage is an example of the most recent improvements and combinations to effect elegance, lightness, and ease.

HOOPER & Co.—*continued.*

A LIGHT PAIR-HORSE 'SEFTON' LANDAU.

2. A light pair-horse 'Sefton' Landau.—The improvements are on the same principle as those of the barouche before described; a careful combination of details giving the utmost strength and durability, combined with lightness.

The drawbacks hitherto considered inseparable from landaus (weight, and partial opening of the head), are

overcome in the carriage exhibited. The head, by a very simple and efficient method of construction, is made to open as flat as a barouche, thus forming when open, almost as airy a carriage, and when closed, a comfortable family carriage, equally adapted for London or country use. Being furnished with covered steps as a brougham, it can be used with or without a footman.

HOOPER & Co.—*continued.*

A SERIES OF CARRIAGE DRAWINGS.

3. A series of Carriage Drawings, coloured and drawn by J. Gilfoy from the original designs (to the scale of $\frac{3}{4}$ of an inch to the foot) of George N. Hooper, are an illustration of the combined efforts of the artist and practical constructor.

4. Medallions of English and foreign heraldry, applicable to dress carriages; also illustrations of the present fashion of grouping monograms, cyphers, coronets, crests, &c., for small carriages.

Mr. HOOPER was the Reporter to the Society of Arts for Carriages at the Paris Exhibition, 1855.

The firm of HOOPER & Co. was the first to introduce the C-spring Brougham on wrought iron perch, and for which a Prize Medal was awarded in 1851. The improved system of construction thus shown to be practicable has not only been generally adopted in England and the continent of Europe, but has completely altered the principle of constructing most modern carriages since 1851, greatly diminishing their weight and cost, and increasing their ease.

The regular importation of the celebrated American light hickory wheels for broughams and other light carriages, was first begun by this firm, as was also the application of photography for illustrating private carriages.

HOOPER & Co. manufacture carriages of the kinds named in the accompanying list, many of which are kept in an advanced state for finishing at short notice to a

choice of colour, for purchase, job, or job with option to purchase (to estimate if required):—

Town coaches.	C-spring broughams.
Do. landaus.	Brakes.
Do. chariots.	Waggonettes.
Barouches.	Mail phaetons.
Driving coaches.	Sporting do.
Light do.	Light road do.
Omnibuses for private use.	Dog-cart do.
Barouche landaus.	Stanhope do.
Sociable do.	T carts.
Sefton do.	Tilbury and Spider
Elcho do.	phaetons.
Sociables.	Cab do.
Pony sociables.	Park do.
Light barouches.	Cabriolets.
Single broughams.	Gigs.
Double do.	Dog-carts.
Segmental do.	Sleighs.
Miniature broughams with	
hickory wheels.	

Dress carriages, and carriages for special purposes, are built to the order of persons who require them. In these cases small drawings 'to scale' are made, and also full-sized working drawings when necessary.

The stock of second-hand carriages consists of sound modern ones of their own build (some but little used), together with a few by the best London builders

[1394]

LA ROCHE, J., & J. MEHEW, 5 *James Place, Marlborough Road, Chelsea.*—Velocipede, the iron work of which is constructed of tube.

[1395]

LENNY, CHARLES, & Co., 9 *Park Lane, London; and Croydon, Surrey.*—Landau sociable for one horse.

This carriage possesses all the necessary requisites for forming without trouble, an open or a closed carriage at pleasure, and is the most complete yet introduced to combine the two purposes; the change is effected instantaneously. There are no detached parts, and the arrangements are so simple as to prevent the possibility of its getting out of order; it has also the advantage over

other carriages of this description in being sufficiently light to be drawn by a single horse.

Messrs. LENNY & Co.'s carriages for exportation are built from a well selected stock of thoroughly seasoned materials, suitable to stand the heat of any climate. Every description of fashionable carriages can be seen at their establishments, filling eight extensive show-rooms.

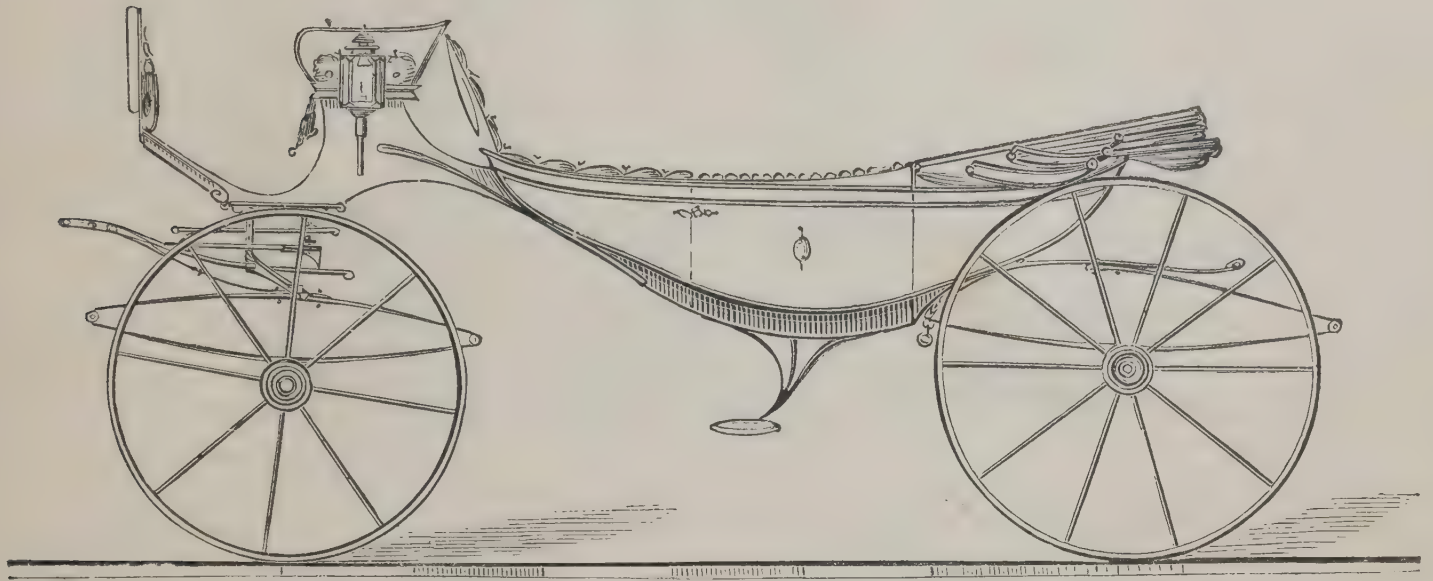
[1396]

MCDougALL, ARCHIBALD, & SON, 36 *Rupert Street, London, W.*—A one-horse van.

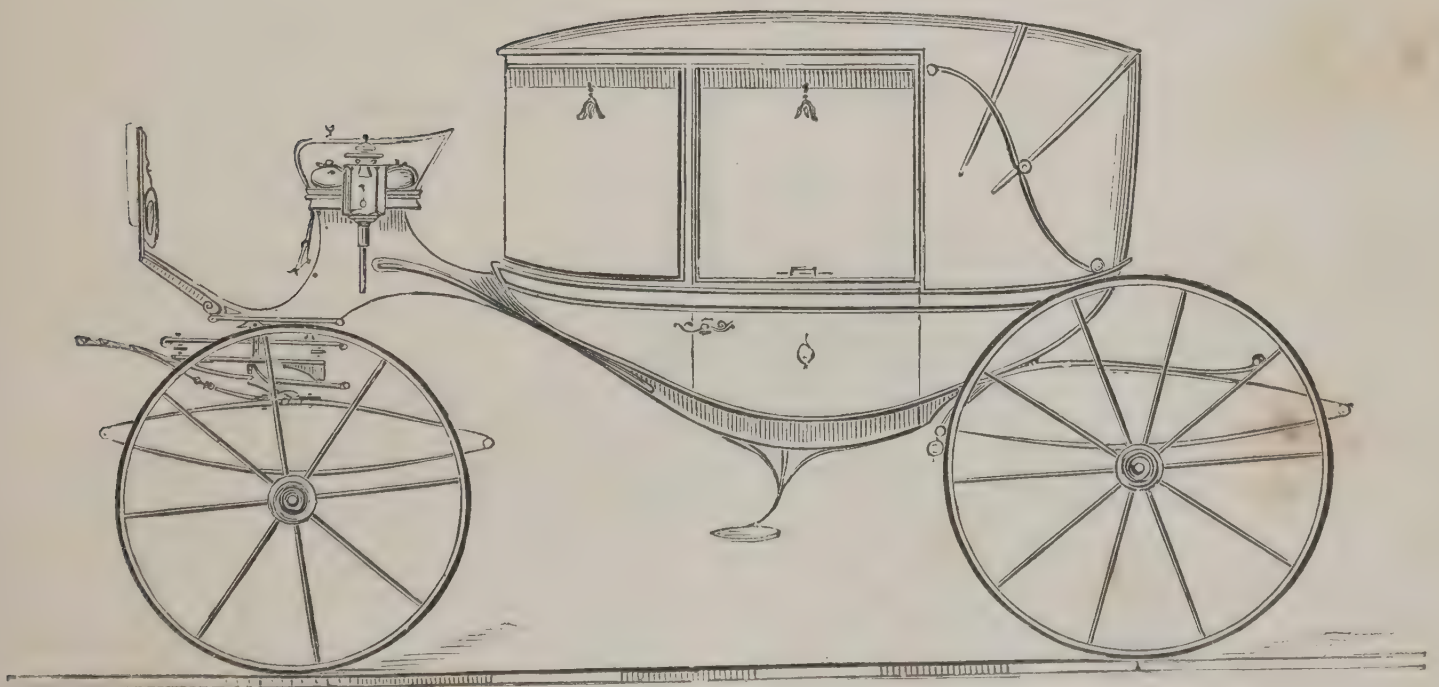
[1397]

McNAUGHT & SMITH, 9, *Tything, Worcester.*—Waggonette. (See page 42.)

KESTERTON, EDWIN, 93 and 94 *Long Acre, W.C.*—The ‘Amempton,’ forming a complete open and close carriage.



THE ‘AMEMPTON’ OPEN.

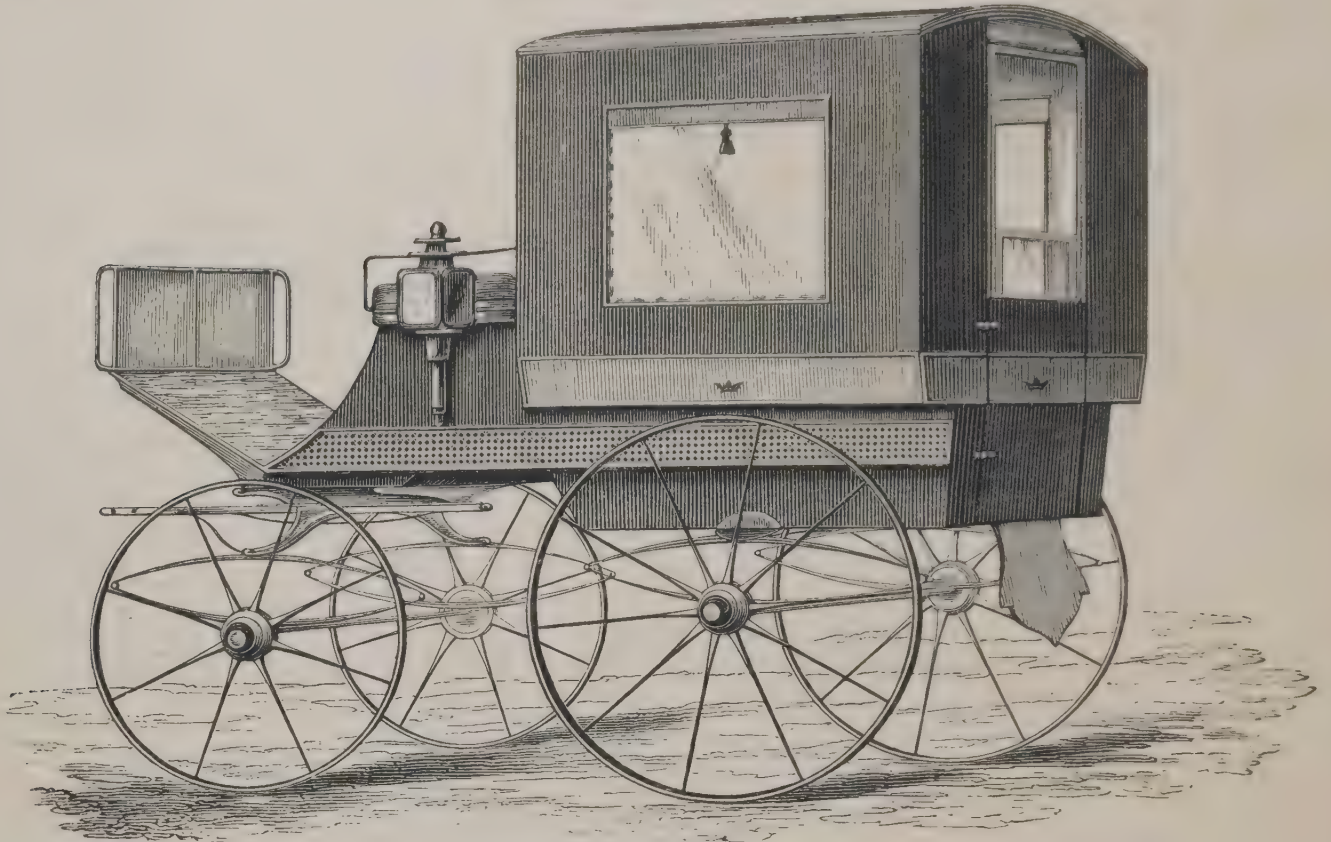


THE ‘AMEMPTON’ CLOSED.

EDWIN KESTERTON is the inventor and builder of the ‘Amempton’ and the ‘Amempton Sociable,’ each forming a complete open and close carriage, well adapted for home or colonial use, being roomy, light, and airy. Sociable Driving Phaeton, forming the light Driving

Phaeton and the useful Waggonette. Patent two-wheeled Dog-Cart, light, strong, and giving entire freedom from the action of the horse. The exhibitor also manufactures Sociable Landaus, Broughams in various sizes, Cabriolet and Park Phaetons, &c. &c.

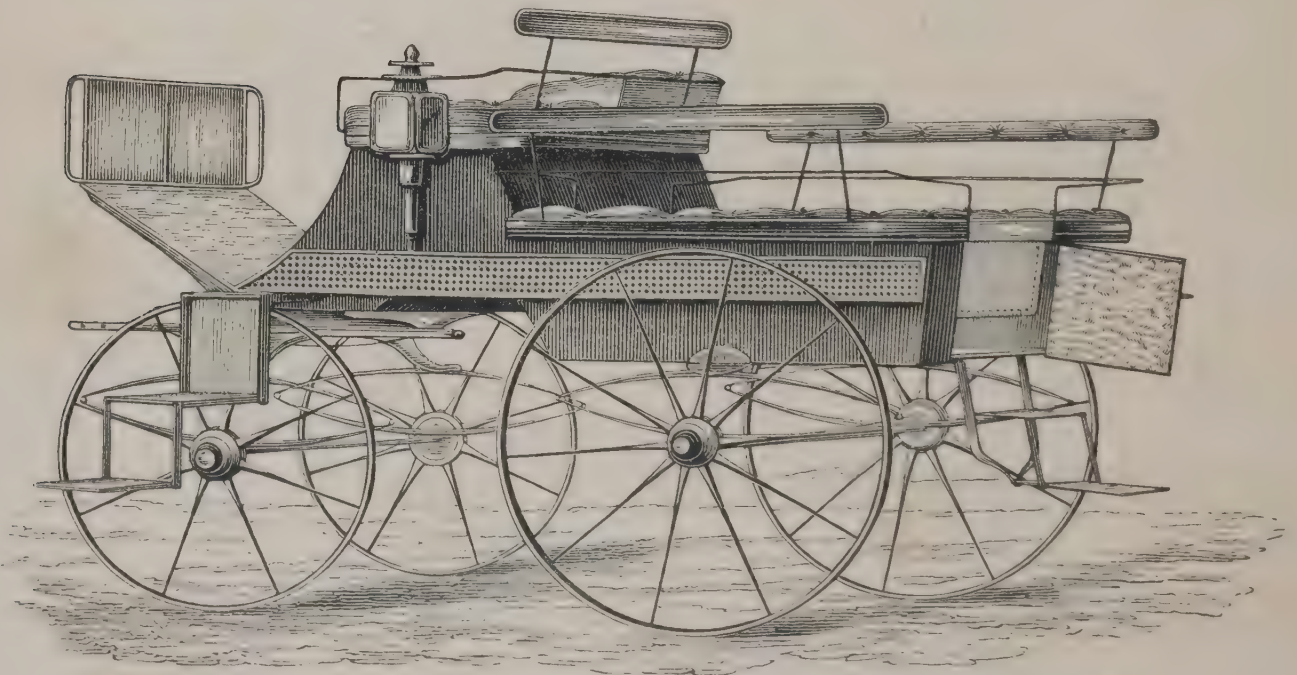
McNAUGHT & SMITH, Worcester.—A waggonette, with movable head and other improvements.



A REVERSIBLE WAGGONETTE CAPABLE OF FIVE DISTINCT FORMATIONS.

- | | |
|------------------------------|----------------------|
| 1. The open Family Carriage. | 3. Mail Phaeton. |
| 2. Close ditto. | 4. Dog-Cart Phaeton. |
| 5. Break or Luggage Cart. | |

Waggonette with enclosure, carrying four or six persons inside.



WAGGONETTE WITH OPEN SEATS.

Waggonette with open seats, and representing concealed folding-step as it appears drawn out over the front wheel; and self-acting folding-step behind.

For further particulars see McNAUGHT & SMITH's own 'illustrated catalogue,' which may be obtained upon application.

[1398]

MACNEE, JAMES, & Co., Coachmakers, 106 *Princes Street, Edinburgh*.—Improved landau Clarence carriage.

[1399]

MANN, J. H., *Twickenham, S.W.*—Park phaeton, with improved fore carriage.

[1400]

MASON, W. H., *Carriage Works, Kingsland Basin, and Clapton*. (See page 44.)

[1401]

MILFORD, THOMAS, & SON, *West of England Wheel Works, Thorverton, Devon*.—A pair-horse spring waggon, for town and road purposes.

[1402]

MULLINER, FRANCIS, *Northampton*.—A Fitzroy phaeton, constructed with malleable steel instead of iron; wheels of hickory.

[1403]

MULLINER, HENRY, *Leamington*.—Four-wheel dog cart, folds open and forms waggonette, head drops on.

[1404]

NEWHAM, EDWARD, *Market Harboro'*.—Light sociable phaeton, with seats and dash removable.

[1405]

NEWNHAM & SON, *Bath*.—Light Bath landau waggonette, with folding leather head and improved arrangement of interior seats.

The Bath Landau Waggonette with folding leather head, which can be instantly opened or closed; having glasses at the sides, front, and back, which drop into body; and an improved arrangement of interior seats. This carriage combines all the comfort of the sociable landau with the

light draught of the waggonette. Its novelty consists in the application of concealed head joints, which draw the hoop sticks inwards, and prevent their protruding beyond the wings when lowered.

[1406]

NEWTON, JOHN, 10 *Werrington Street, London, N.W.*—Folding double-seated perambulator with improved sheathed wheels.

[1407]

NURSE & Co., 200 *Regent Street, W.*—Sociable landau. (See pages 46 and 47.)

[1408]

OFFORD, R. & J., 79 *Wells Street, W.*—Carriages. (See page 45.)

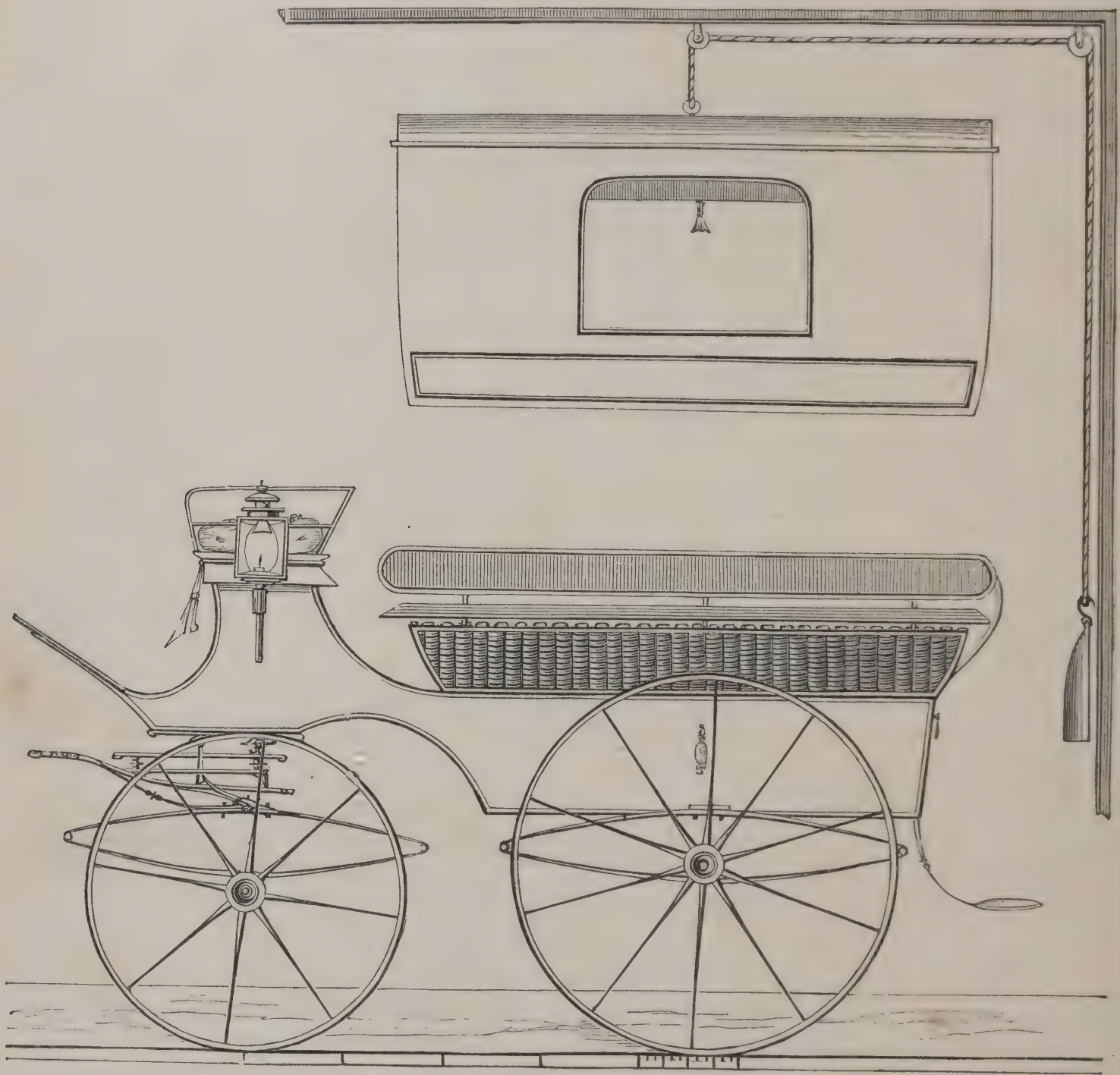
[1409]

PARKER, F., 75 *Regent Street, Cambridge*.—Registered family cart with improved springs, free from knee motion.

[1410]

PARSONS, G., *Martock, Somerset*.—Wheels for common roads. (See page 48.)

MASON, W. H., *Carriage Works, Kingsland Basin, and Clapton.*—Waggonette, carrying ten persons, on improved principles, forming an open break, or exceedingly light omnibus.



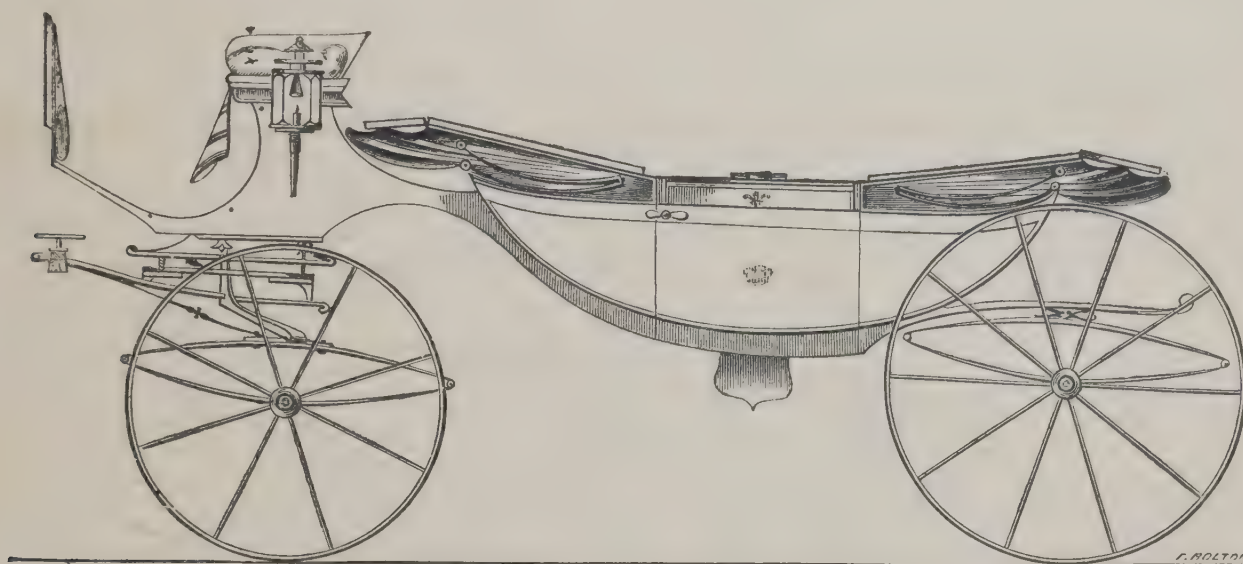
WAGGONETTE FOR CARRYING TEN PERSONS.

W. H. MASON manufactures superior light Sociables; Broughams; Mail, and Driving Phaetons; Waggonettes forming perfect Stanhope Phaetons; Dog-Carts; road and town Buggies.

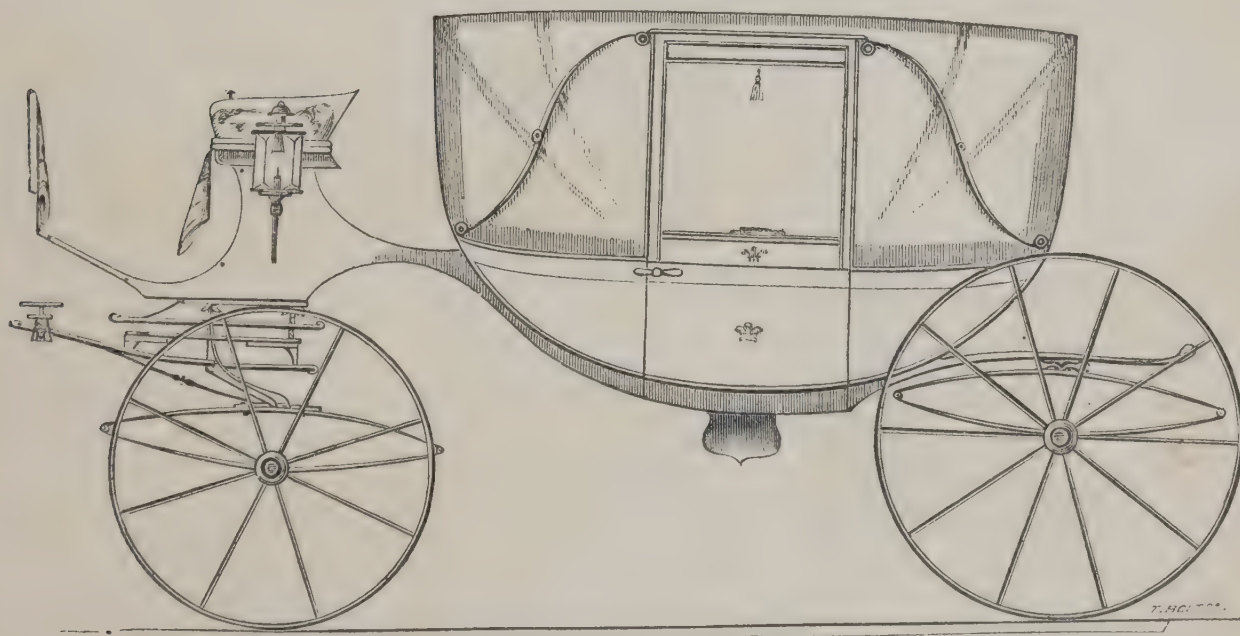
The carriage exhibited is strongly recommended for its

extreme lightness of draught and luxurious roominess. It forms a convenient carriage for winter or summer use, can be successfully worked with one horse, and is made of various sizes.

OFFORD, R. & J., 79 Wells Street, Oxford Street, London.—Carriages.



OFFORD'S EXHIBITION LANDAU, OPEN.



OFFORD'S EXHIBITION LANDAU, CLOSED.

These engravings represent a carriage manufactured by Messrs. OFFORD, of Wells Street, Oxford Street, London. It forms, as shown in the drawings, a perfect summer and winter carriage in one; and having no loose parts, can be opened or closed at any time in a few minutes. Several novel, striking, and commendable points deserve notice. The wheels are manufactured partly of wrought iron and partly of wood, combining lightness with increased strength. Upon the front wheels are exhibited Offord's New Patent India-rubber Tire, affixed to them without flanges in a manner ensuring continuous adhesion. These tires are productive of much comfort to the riders, and effect a considerable saving in the wear of the vehicle. The under-carriage is formed of iron-work of a new and improved design, remarkable for its lightness, elegance, and durability.

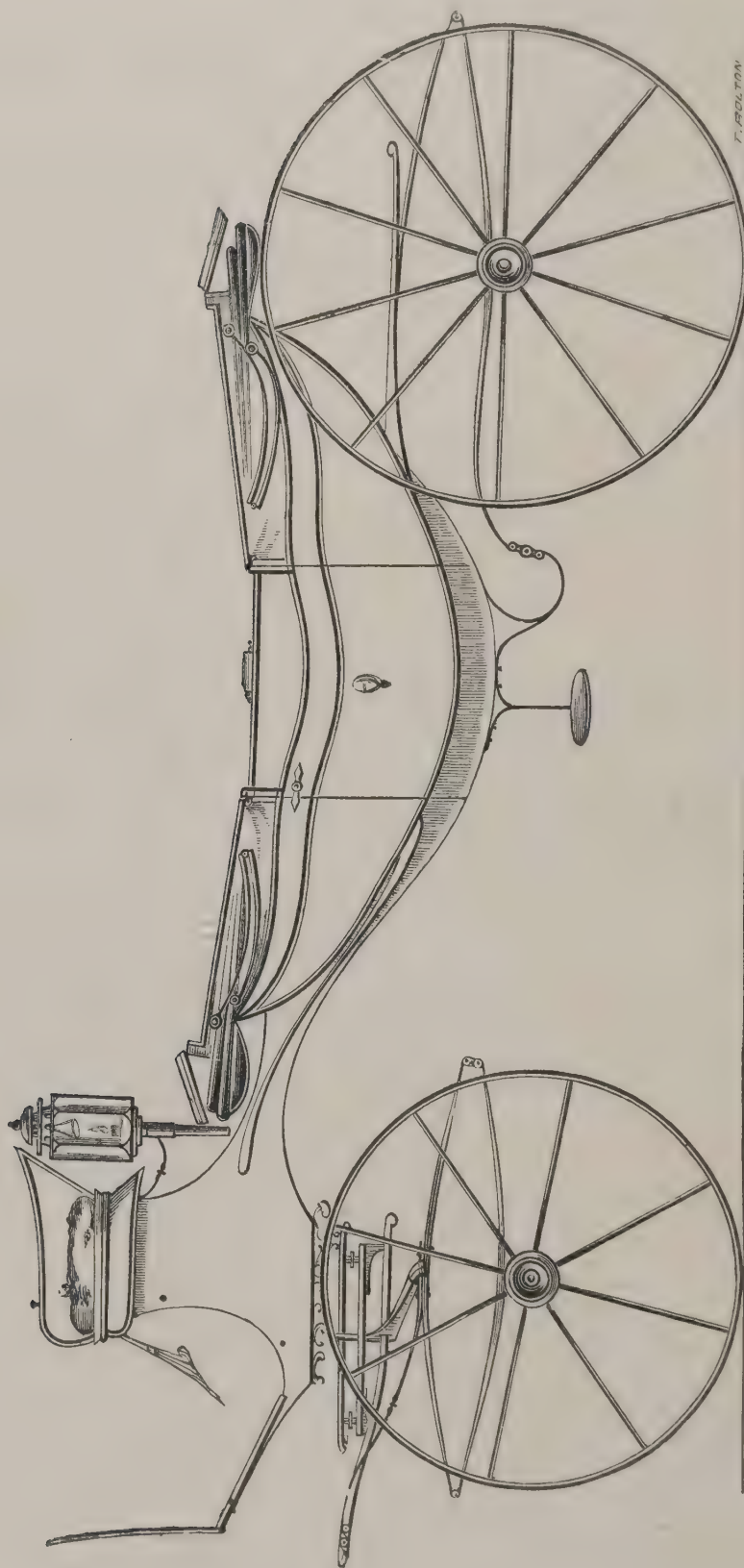
The window frames are specimens of another patented

invention. They are made of soft india-rubber, united with the well-known solid material called vulcanite, or hard india-rubber. They are noiseless, elegant in appearance, and, from the nature of the hard material, are calculated to last as long as any carriage.

The interior is made more cheerful than usual by increasing the size of the windows, and by the addition of an extra one in the back, by means of which ventilation can be obtained without draught; or a current of air circulated quite through the vehicle when desired.

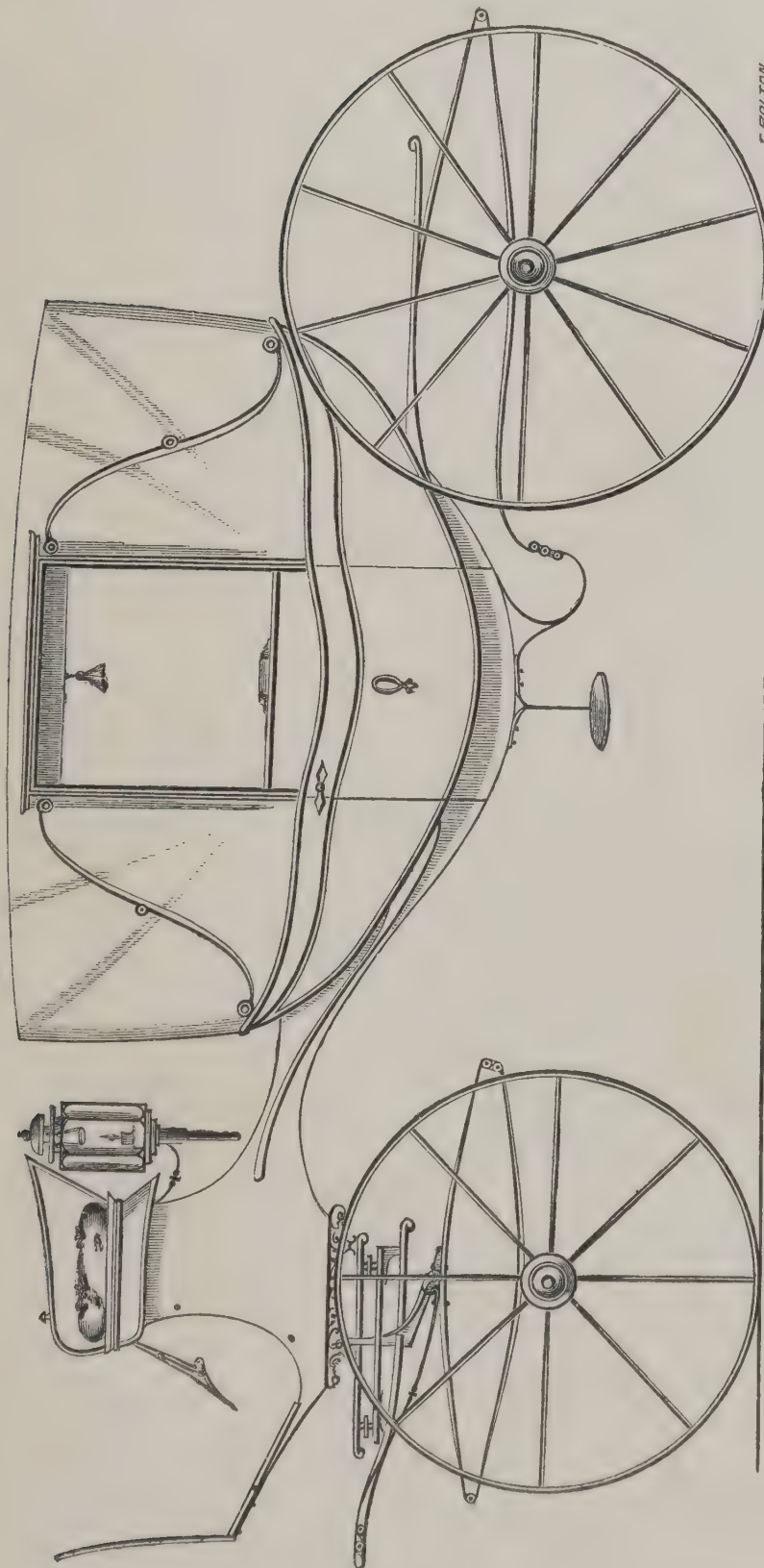
The silk and trimmings are new and elegant in design, and tastefully arranged. When opened, the head or upper part falls very flat, and presents none of the usual unsightly projections. The steps are made to open and close with the door by a new and very simple method, for which Letters Patent have been obtained.

NURSE & Co., 200 *Regent Street, W.*—Sociable landau on elliptic springs.



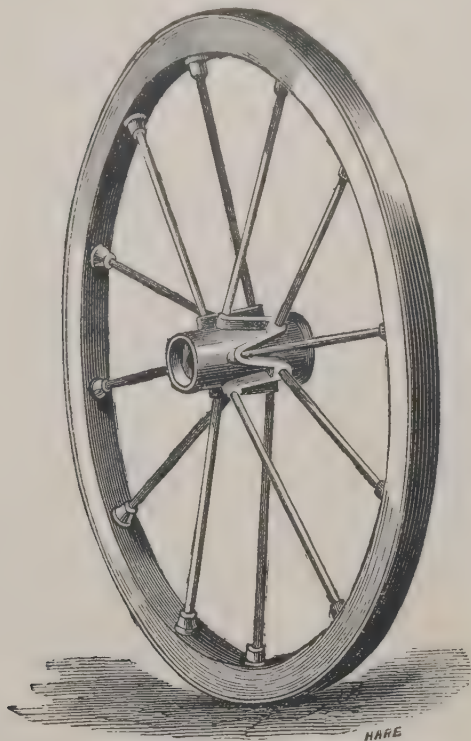
SOCIABLE LANDAU, OPEN.

NURSE & Co.—*continued.*



SOCIABLE LANDAU, CLOSED.

PARSONS, GEORGE, *Marlock, Somerset*.—Patent wheels, specially adapted for common roads in tropical or other climates.



These wheels possess in themselves every advantage that belongs to wood and iron, besides the mechanical improvements protected by Letters Patent. The iron spokes are cast in the nave, and therefore, cannot, like wood, split and decay. The felloes are of wood, as the periphery or rim of cast wheels chips and cracks; but mortice-holes are dispensed with, as the spokes are let in with a small auger. A worm is turned on the end of each spoke, to receive a boss or nut, which is screwed up to the felloe to equalise the bearing and render fretting impossible. If the felloes loosen from shrinking in extremely dry weather, a turn of these nuts will make them again perfectly fast. These wheels are shod with whole bonds, or, if preferred, with streaks, in the usual way. The best materials are introduced, and each part is fitted and turned with mechanical accuracy.

Prices, and further particulars may be learned by applying at the Works.

[1411]

PARTRIDGE, EBENEZER, *Smethwick, near Birmingham*.—Improved patent (Collinge and Mail) carriage axletrees.

In presenting these patent axles to the notice of the public it may be observed, that iron varies in soundness, and that axles constructed on the Collinge principle (though admitted to be the best hitherto adapted for general carriage purposes), are always weakened by the shouldering down required to receive the collets and nuts; and by having no protection to prevent the wheel or wheels of carriages running off, should the axle or axles break anywhere in the journal, or screwed part. To overcome these defects, and to obtain a security against breakage, is of the utmost importance, and such security is insured by the use of E. Partridge's Trebly Patented Safety Axles. The principle having been thoroughly tested, the inventor offers them to the trade with perfect confidence, as an article which must extensively command public patronage.

ADVANTAGES.

1. Cheapness.—The price is lower than that of any other axle now before the public.

2. Construction.—The extreme simplicity of its construction is such, that even an inexperienced person will readily understand it, and be able to adjust the parts when required.

3. Durability.—The new process of hardening the inner part of the box only, leaving the outer part of it to retain its density, renders the box much more durable than those hardened under the old process. The axles are subject to a similar process, and consequently have the same advantages.

4. Security against Accidents.—By the use of an inner cap and screw pin, any one or all of the wheels of carriages are prevented running off, should the axle or axles break anywhere in the journal or screwed part.

5. A direct lubricator is also provided for giving a little oil occasionally in travelling, when no particular examination is required.

[1412]

PATERSON, T., *15 Rupert Street, Haymarket*.—Improved carriage window.

[1413]

PEARCE & COUNTZE, *103 Long Acre*.—Sociable landau. (*See page 49.*)

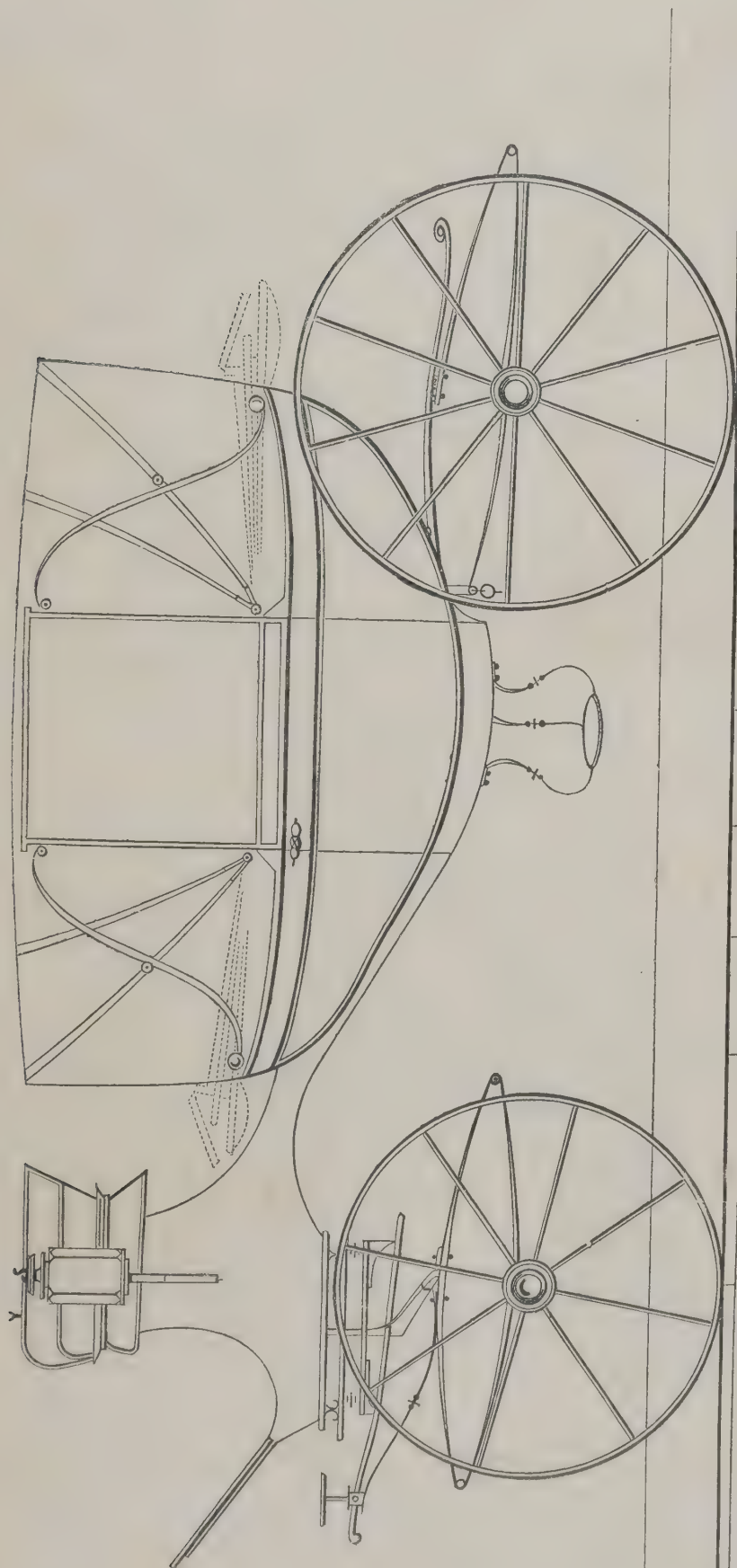
[1414]

PETERS, THOMAS, & SONS, *Park Street and Upper George Street, London, W.*—A park barouche and a brougham.

[1415]

REAY & USHER, *South Hylton Iron Works, Sunderland*.—Axle block forgings, finished under the forge hammer.

PEARCE & COUNTZE, 103 *Long Acre*.—Sociable landau, and materials used by them in carriage building.



SOCIABLE LANDAU.

E. & J. V. ANS.

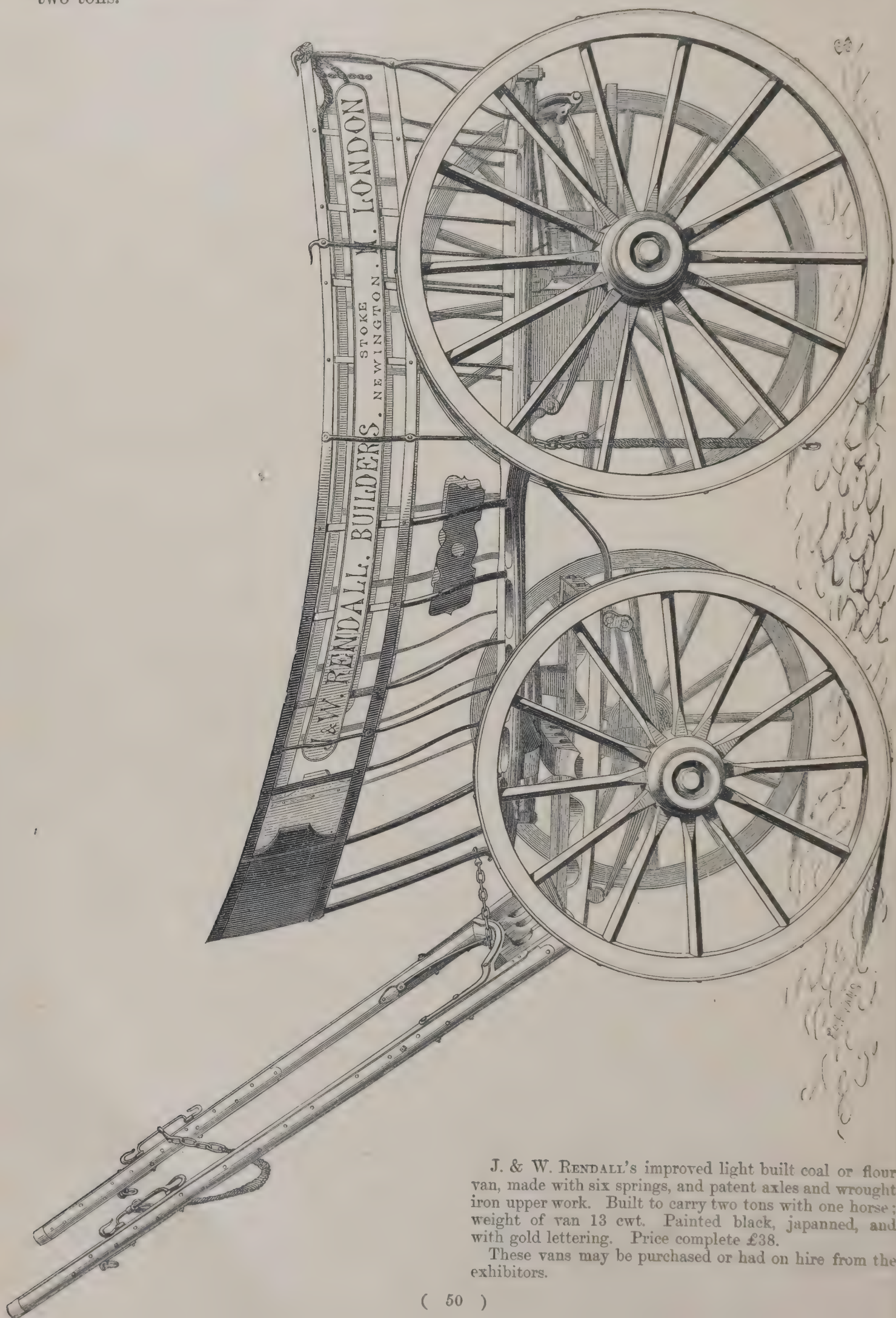
A SOCIABLE LANDAU, as finished from the body and carriage maker's benches, before the painting and lining is commenced, exhibiting the wood, ironwork, and quality of workmanship employed in the construction of the exhibitors' carriages.

Specimens of the materials used by the exhibitors in carriage building.

Every description of fashionable carriage may be seen finished, and in the various stages of progress, at Pearce and Countze's manufactory.

[1416]

RENDALL, JOHN & WILLIAM, *High Street, Stoke Newington, N.*—Improved coal van to carry two tons.

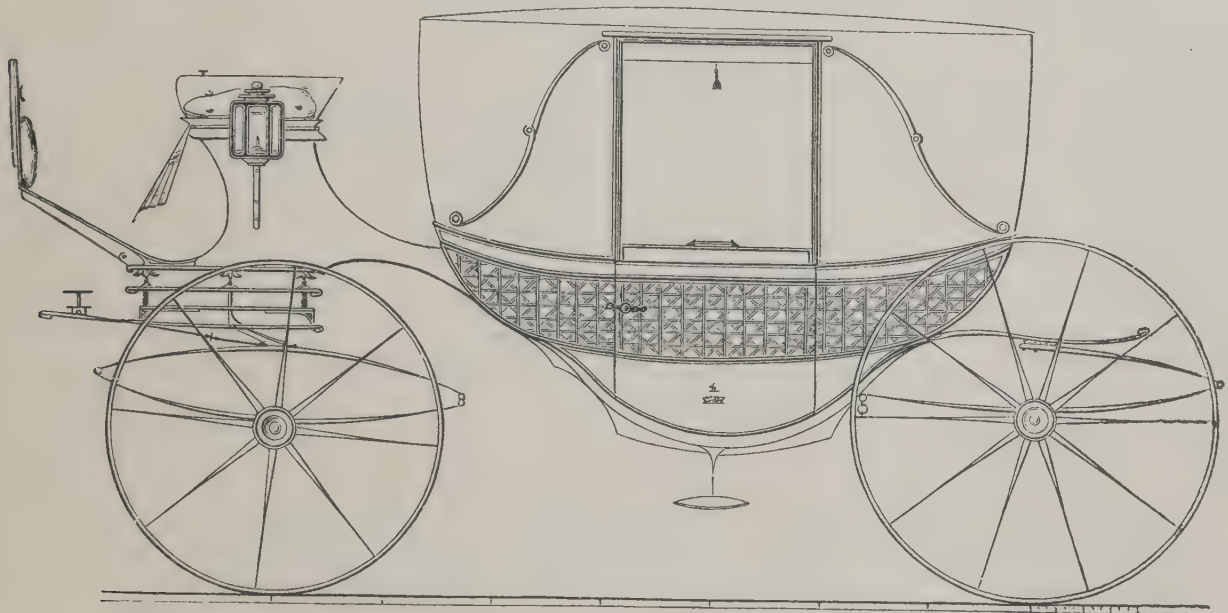


J. & W. RENDALL'S improved light built coal or flour van, made with six springs, and patent axles and wrought iron upper work. Built to carry two tons with one horse; weight of van 13 cwt. Painted black, japanned, and with gold lettering. Price complete £38.

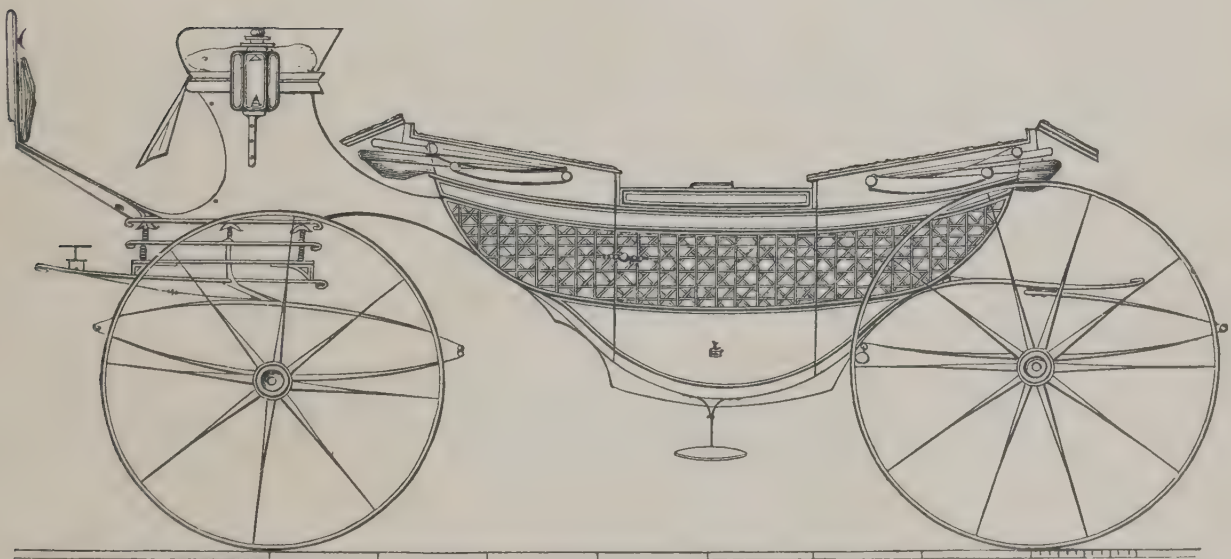
These vans may be purchased or had on hire from the exhibitors.

[1417]

RIDGES, JOHN EDWARD, *The Tudor Coach Manufactory, Cleveland Road, Wolverhampton.*—A miniature landau carriage to open and close.



SOCIABLE LANDAU, CLOSED.



SOCIABLE LANDAU, OPEN.

The above engravings represent a Sociable Landau Carriage, weighing only $9\frac{1}{2}$ cwt. This is the only carriage that will make a perfect open and close carriage without requiring even a wrench to change it. It has large front windows, and is perfect either open or closed. It is quite

manageable for one horse, and is also an elegant vehicle for two horses. In either form it is highly suitable for ladies' use. Carriages of all descriptions, finished fit for immediate use, may be purchased from the exhibitor or had on hire. Drawings and estimates will be sent on application.

[1418]

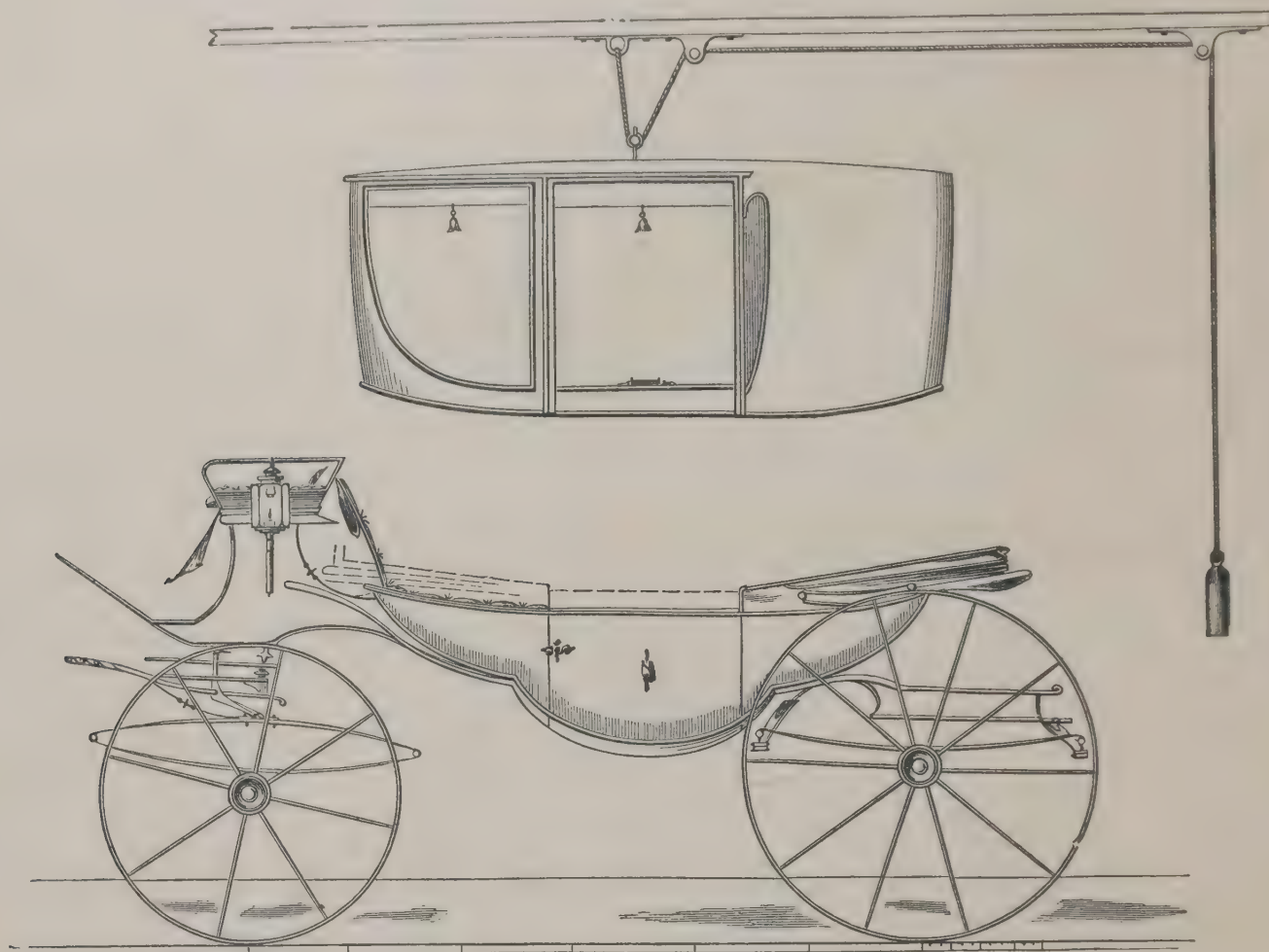
RIGBY & ROBINSON, 7 *Park Lane, Piccadilly.*—Elcho barouche landau. (*See page 53.*)

[1419]

ROBINS, WILLIAM, 1 *Church Street, Lambeth.*—Patent revolving break for omnibuses and other vehicles.

ROCK & SON, *Hastings*.—A Dioropha with patented improvements.

Obtained Prize Medals at the Exhibition of 1851, and at Paris, in 1855.



SOCIABLE WITH INTERCHANGEABLE HEADS, AS RECENTLY PATENTED.

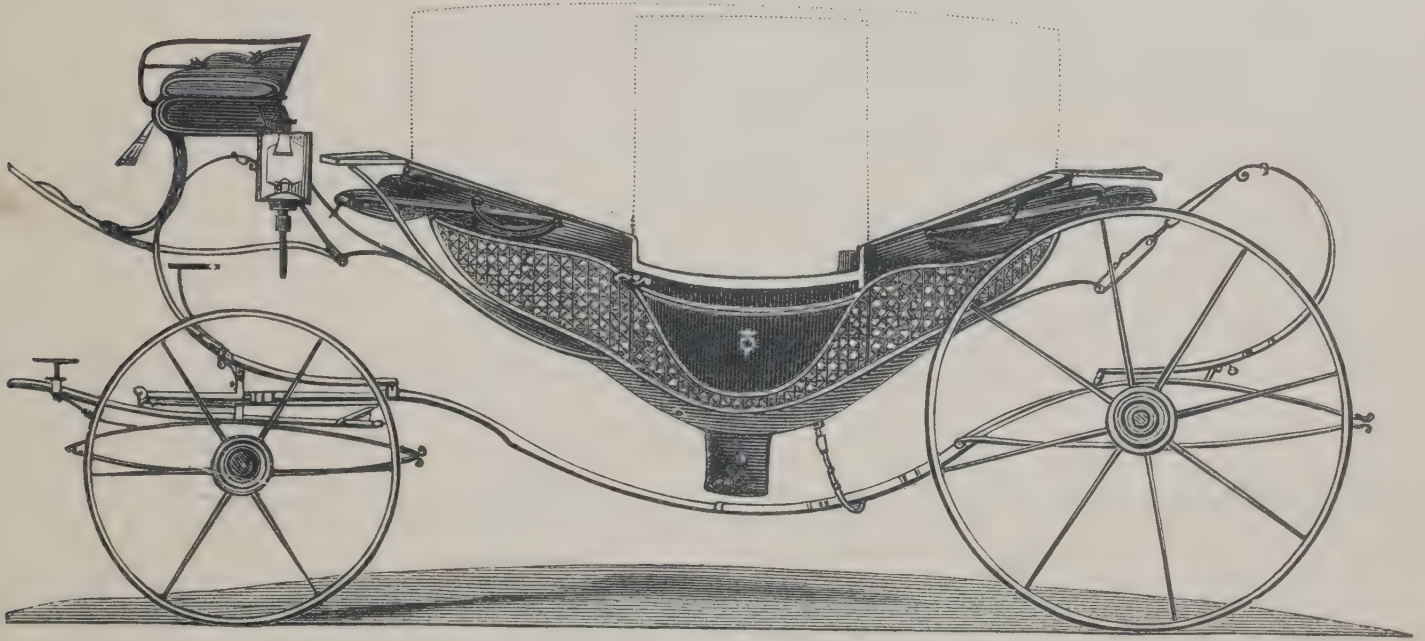
Parts of the improvements shown in this Carriage are applicable to the Dioropha (Rock's Patent), the Sociable Landau, and other Carriages.

NETT PRICES, 1862, NOT INCLUDING RUMBLES.

	One-horse.	Medium.	Pair-horse.		One-horse.	Medium.	Pair-horse.
SOCIABLE, with interchangeable heads, as exhibited, forming three distinct carriages, viz., coach, landau, and barouche	210	235	265	SEMI-DIOROPHA — the hinder half of landau head a fixture; the front half to remove, and change for barouche flap	170	190	215
				SOCIABLE LANDAU, with patented improvements	160	180	200
DIOROPHA, with coach head, interchangeable with barouche head and flap, as exhibited in 1851 and 1855, forming either coach or barouche	180	200	225	SINGLE BROUGHAM	120	130	140
				DOUBLE BROUGHAM, with round or elliptic front	130	140	150
DIOROPHA, with landau head, interchangeable with barouche head and flap, forming landau or barouche	190	210	240	OPEN SOCIABLE, with half-head	130	145	160
				Ditto, enclosed, with glass doors, &c.	145	165	180
				WAGGONETTE	65	75	90

DOG-CARTS, from 30 guineas; VICTORIA PHAETONS, 55 to 90 guineas. PONY PHAETONS, from 25 guineas.

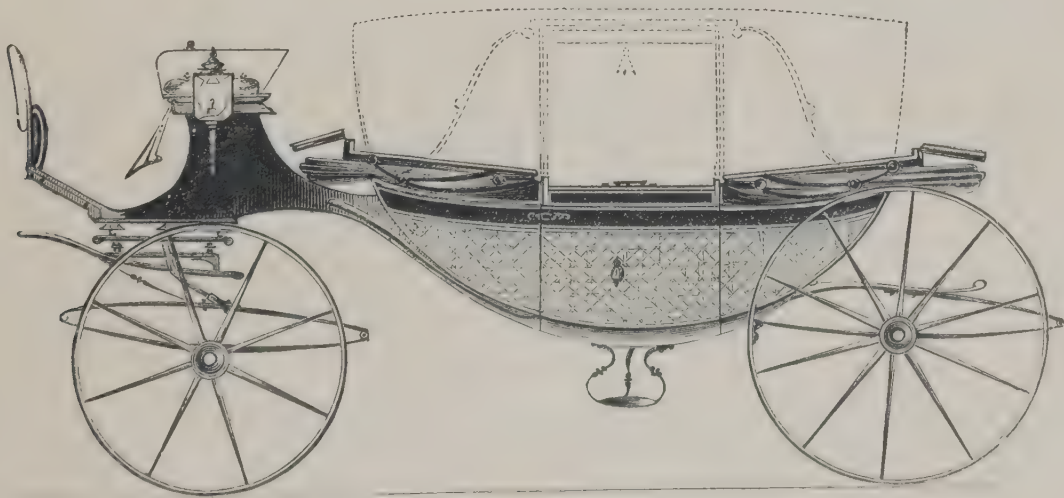
RIGBY & ROBINSON, 7 *Park Lane, Piccadilly, London.*—Elcho barouche landau, combining elegance, extreme lightness, and ease.



THE ELCHO BAROUCHE LANDAU, INVENTED AND MANUFACTURED BY RIGBY AND ROBINSON.

[1421]

ROGERS, I., *North Audley Street, London.*—Sociable landau, for one horse; a perfect open or close carriage.



MINIATURE SOCIABLE LANDAU.

The above engraving represents a Miniature Sociable Landau—the only kind of perfect open and close carriage combined, without movable parts, and within the management of one horse, ever introduced. Its design in either

form is elegant: when closed, it is cheerful, having a large front window. Others, finished and building, with every description of fashionable carriage, are always kept in stock, fit for immediate use.

[1422]

ROGERS WILLIAM, & Co., *Bristol*.—The ‘Clifton Waggonette.’ (See pages 56 and 57.)

[1423]

SAWYER, W., *St. James Street, Dover*.—Drawings of velocipedes.

[1424]

SEADON & JONES, 60 *Whitechapel*.—Sociable, with removable inclosure, to carry six persons, for one horse.

[1425]

SELLERS, J. A., 313 *Oxford Street, W.*—Model of a carriage.

[1426]

SHANKS, MESRS., 4 *Great Queen Street, W.C.*—Light step-piece landau, opening very low.

[1427]

SHEPHERD, JOHN, 1 *Cheapside, Birmingham*.—A light and roomy one-horse brougham, hung on noiseless springs.

[1428]

SHERWIN, JOSEPH, *Tabernacle Walk, Finsbury*.—Omnibus, chaise, carriage, and cart axle-trees. Waggon and cart arms manufacturer.

[1429]

SHILLIBEER, GEORGE, 40 *City Road*.—Patent ‘vis-à-vis’ omnibus, inside seats separated, outside seats reached from interior.

<p>The PATENT VIS-À-VIS OMNIBUS comprises advantages which the omnibuses in use do not possess, both as regards the public and proprietors; viz., free ingress to and egress from the interior. The passengers are not ‘packed,’ as in the present omnibuses; the outside</p>	<p>seats are easily and safely reached, and females can ride outside with propriety. A capôte, easily raised, covers two-thirds of the outside passengers in wet weather, thereby greatly benefiting the proprietors. The carriage weighs one ton.</p>
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[1430]

SHORT, JAMES, 23 *Cleveland Street, Fitzroy Square*.—Heraldic mountings for carriages, harness, &c.

[1431]

SILK & SONS, *Long Acre*.—Landau on horizontal springs, painted green and crimson, lined with green silk.

Obtained a Prize Medal in 1851.

<p>A full size FAMILY LANDAU, with hind seat, the head arranged to fall very flat, and the pillars of the front window to fall clear of each other. The body painted a</p>	<p>dark transparent green, and the under carriage and wheels a rich crimson. The inside lined with silk of a neat and chaste design. The lamps and mountings in brass.</p>
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[1432]

SIMPSON, HORTENSIVS C., *Shrewsbury*.—Car, carrying from one to six passengers, with extra luggage accommodation.

[1433]

SMITH, JOHN BENNETT, *Green Street, Bath*.—Silver-mounted perambulator.

[1434]

STAREY, T. R., *Nottingham*.—Light landau (The Granville), with flat fall of head, new highly elastic springs, and silent wheels, with chain tires.

Obtained first-class Medal at the Paris Exhibition, 1855.

The 'GRANVILLE LANDAU,' clipper shape, forms a perfect winter and summer carriage for a pair of light riding horses. The head by a new arrangement falls quite flat, lower than has hitherto been accomplished. It is strengthened throughout with mild steel instead of iron, whereby a maximum of strength with a minimum of weight is obtained. It is hung on highly elastic springs with india rubber bearings, and Messrs. Apperley & Co.'s

'patent silent wheels,' with flexible iron tires bedded in india rubber, a combination that insures greater durability to the wheels and carriage, as well as a remarkably soft, easy, and noiseless motion. The doorway is unusually wide to suit the present style of dress; and while having a very large window on each side, the occupants are not unduly exposed to view. The colour of this carriage was suggested by Owen Jones, Esq.

[1435]

STARTIN & MACKENZIE, *Benacre Street, Birmingham*.—Headed phaeton, with driving-seat, suitable for export.

[1436]

STEVENSON & ELLIOT, 177, 179, 181 *King Street, Melbourne, Australia*; Branch Factory, *Stirling, Scotland*.—Light phaeton, with movable side glasses.

BAROUCHE with movable side glasses. This carriage is similar to those built by the exhibitors in Melbourne. It combines lightness with great strength. The construction of the wheels is somewhat unusual, the felloes being bent by steam and having only two pieces in each wheel. They are so constructed as to be capable of resisting shocks of a severe nature, and are in every

respect very durable. This is a desirable carriage for this country, India, or Australia; it is fitted for one horse or a pair of ponies; built of the best materials, extra and highly varnished. The broughams manufactured by the exhibitors are equally light. Communications to be addressed to our Branch Factory, *Stirling, N.B.*

[1437]

STOCKEN, FREDERICK, *5a Halkin Street, Belgrave Square, S.W.*—Carriage.

[1438]

STRICKLAND, HENRY, *9 Macclesfield Street, Soho*.—Specimens of heraldic carriage painting

[1439]

THOMSON, GEORGE, *Stirling, Scotland*.—Light waggonette, to close or open at pleasure, with reversible seat and set of harness.

[1440]

THOMSON, WILLIAM, *Perth*.—Registered four-wheel dog cart.

THE PERTH FOUR-WHEEL DOG-CART, Registered, highly approved for lightness, elegance, and convenience. Price 50 guineas delivered.

WAGGONETTE, easily convertible into a four-wheel Dog-Cart. Price 65 guineas delivered.

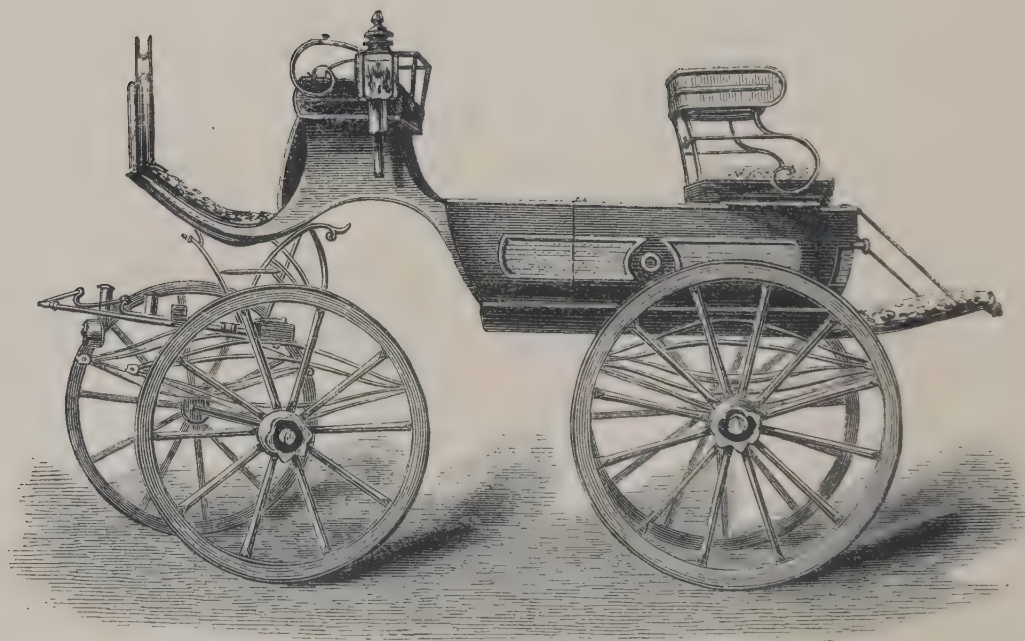
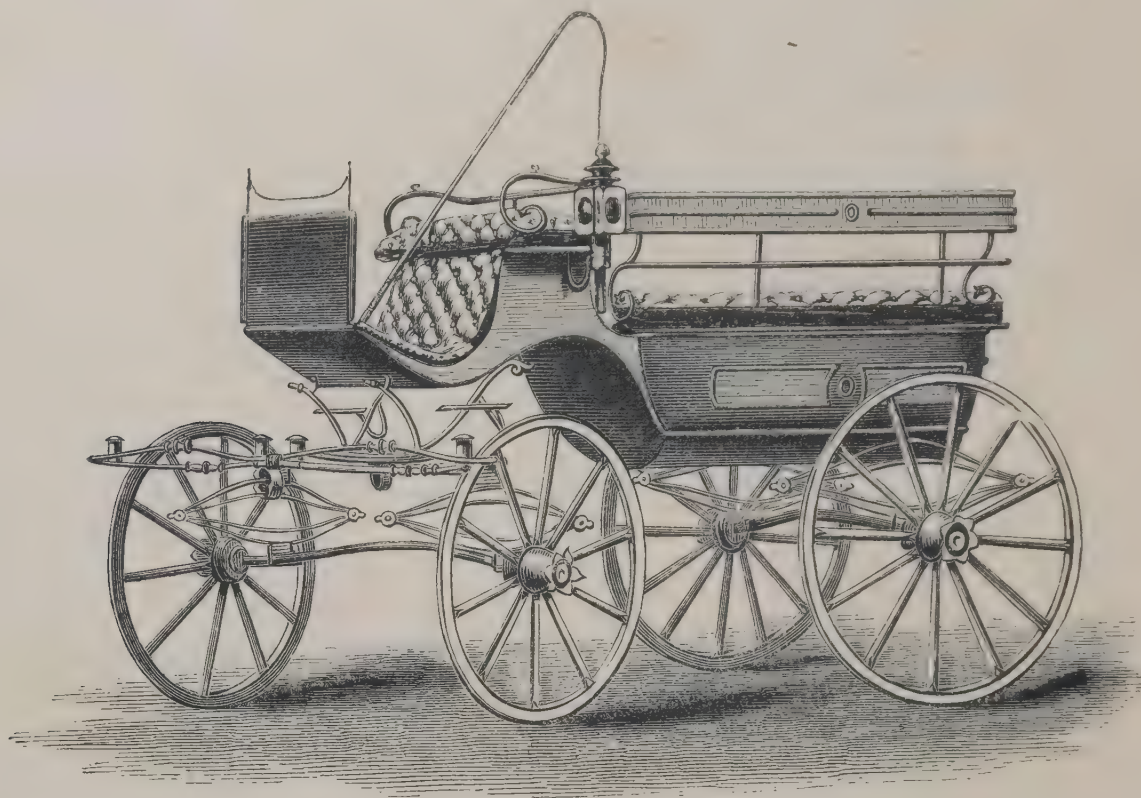
[1441]

THORN, W. & F., *19 Great Portland Street, W.*—Summer and winter carriage. (*See page 58.*)

[1442]

THORNTON, E. M., *6 Brooke Street, Holborn*.—Patent rein-clip; for the reins when out of hand.

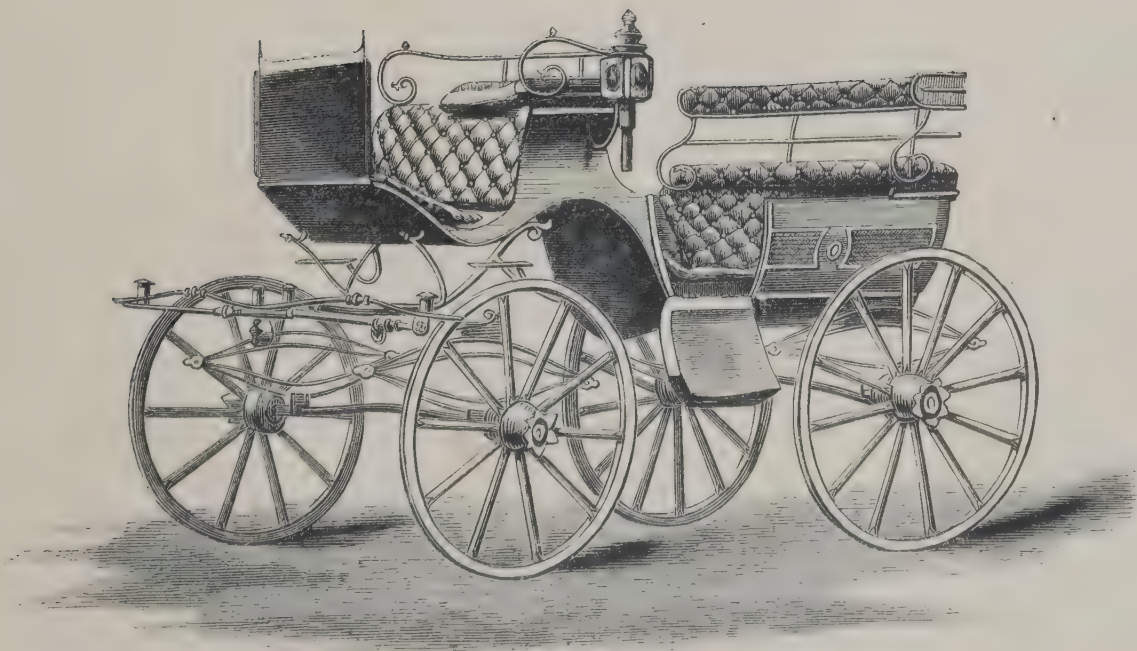
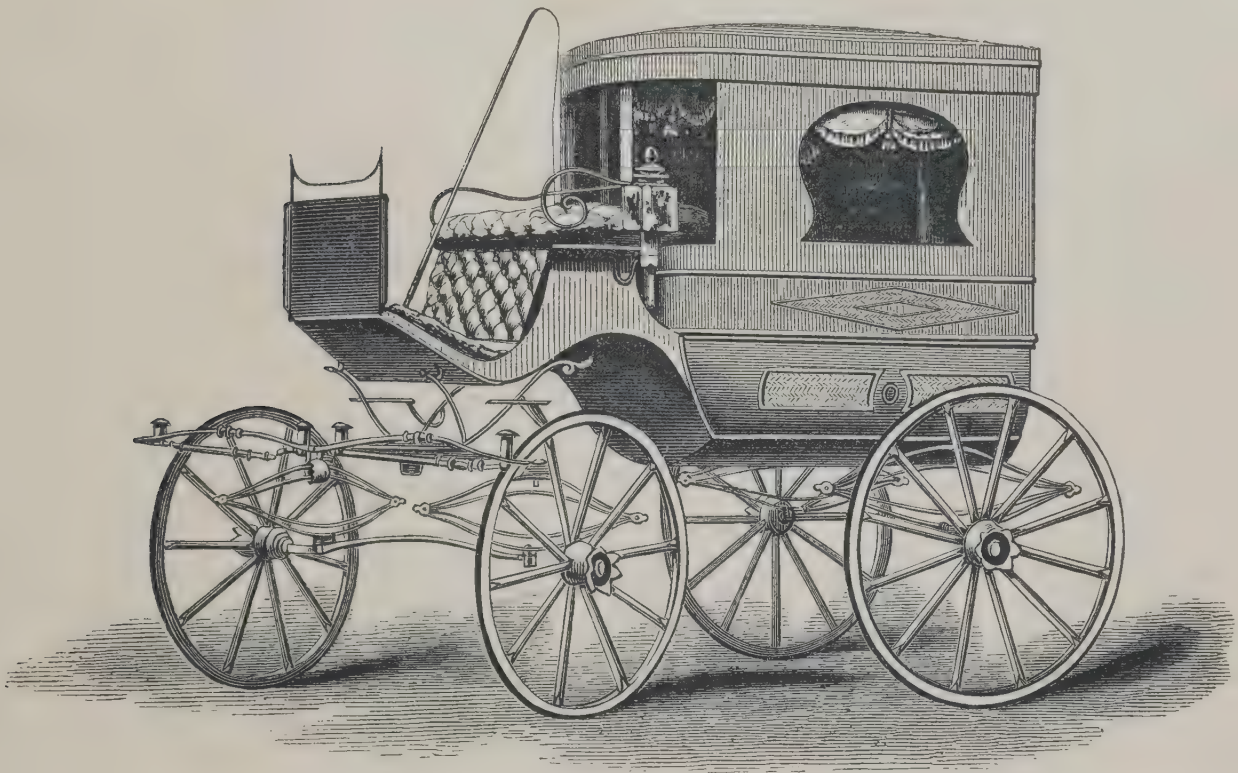
ROGERS, WILLIAM, & Co., *Bristol*.—The ‘Clifton Waggonette.’



The REGISTERED CLIFTON WAGGONETTE, one of the most elegant and novel carriages of this class yet introduced. It is capable of being transformed into four distinct equipages, viz. a Waggonette, Driving Phaeton, Dog-Cart, and Close Carriage. The elegant sweeps of the iron work and novel method of transforming it from a single to a

pair-horse carriage; the lightness and ease of the springs: the peculiarity of ascent to the body, and the power of raising or lowering the canopy top, recommend it as one of the most useful carriages of its class. A large assortment of well seasoned carriages for exportation are always kept in stock.

ROGERS, WILLIAM, & Co.—*continued.*



[1443]

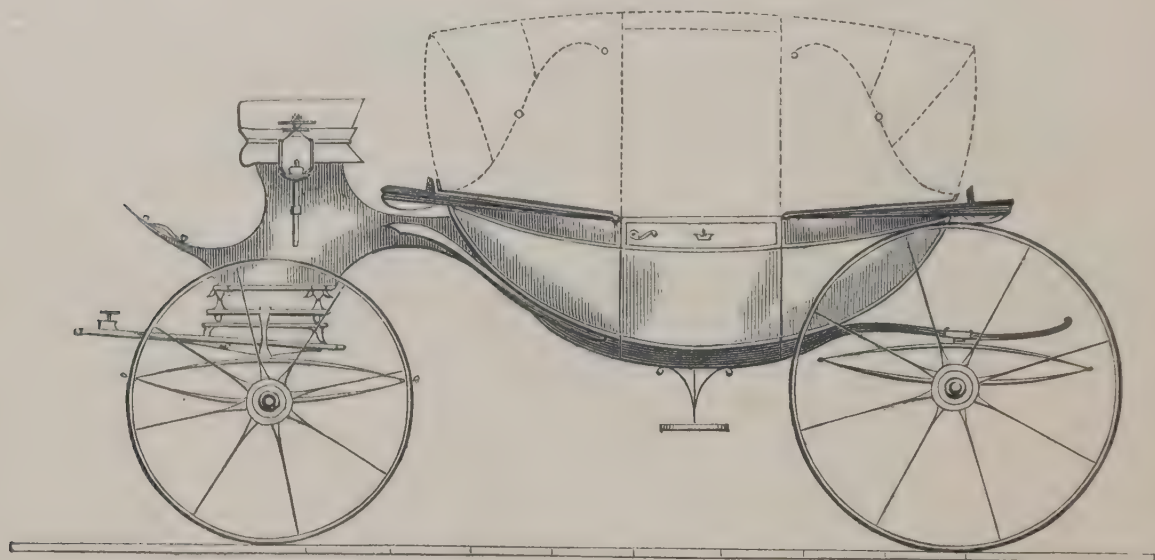
THRUPP & MABERLY, 269 *Oxford Street*.—Elliptic spring coach. (*See page 59.*)

[1444]

TURRILL, HENRY LEWIS, 67 *South Audley Street*, and 22 and 23 *Long Acre*.—Carriage.

H. L. TURRILL (late Robson & Co.), is coachbuilder by appointment to Her Majesty, original builder of the 'Shofle, or Gentleman's Hansom,' and manufacturer of every description of carriage. Carriages are let on hire by the exhibitor for any period, with option of purchase.

THORN, W. & F., 19 *Great Portland Street*, W.—Improved summer and winter carriage, perfect open or closed.



SUMMER AND WINTER CARRIAGE.

W. and F. THORN build to order every description of carriage, and have always on hand a large stock, which may be jobbed with option of purchase. They have had great experience in building carriages for exportation, and are the inventors of the patent equi-motive springs.

[1445]

VEZEY, R. & E., *Long Acre*, Bath.—Brougham, with patent concealed step, noiseless springs, on india-rubber bearings.

Coach-builders to Her Majesty, and patentees of springs on india-rubber bearings, and concealed descending brougham steps.

[1446]

WARD, JOHN, *Leicester Square*.—Invalid pleasure-ground chairs, and children's perambulators, to be drawn by hand or animal.

[1447]

WATERS, G. & SON, 5 *George Street*, and 72 *North End*, Croydon.—One open carriage.

[1448]

WATKINS & HORNSBY, *Duke Street*, Birmingham.—Patent carriage axles.

[1449]

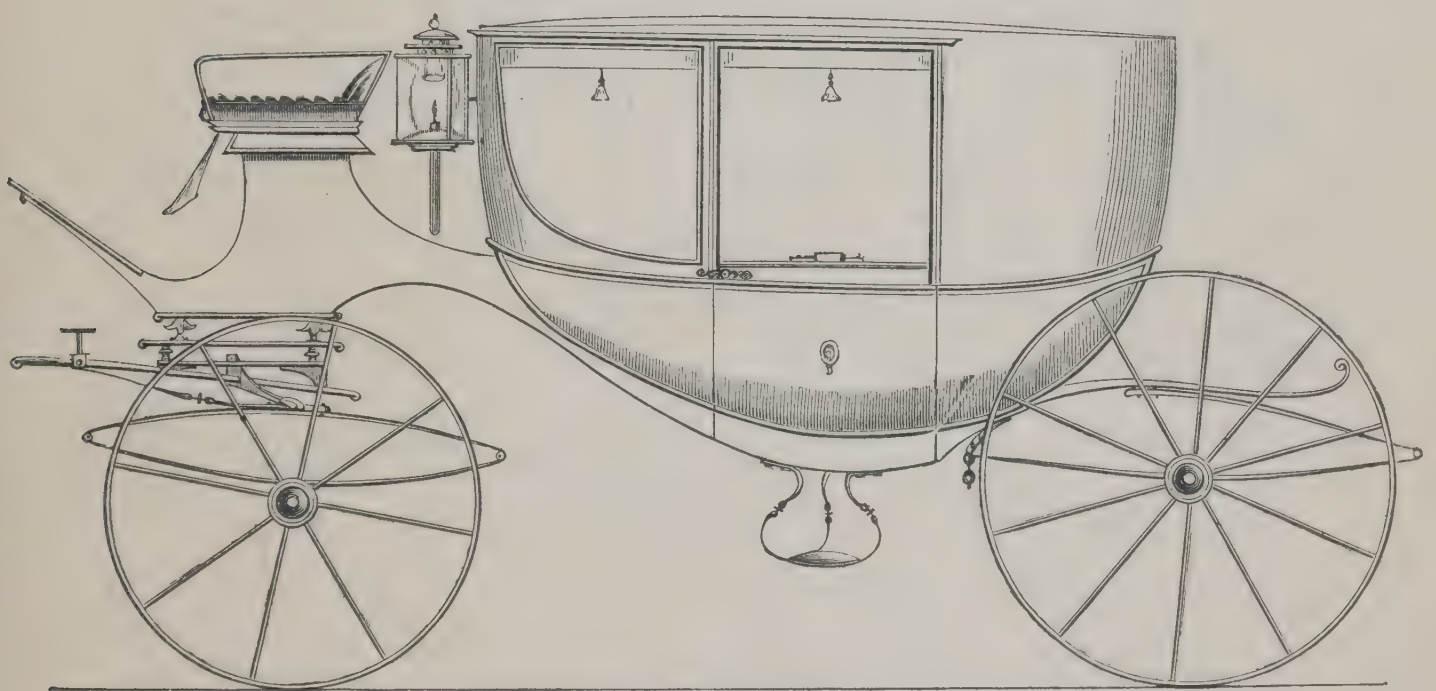
WHITTINGHAM, THOMAS, & WILKIN, 136 *Long Acre*, W.C.—Carriage laces.

[1450]

WICKSTEED, FREDERICK, 18 *Upper St. Martin's Lane*.—Carriage drawings.

THRUPP & MABERLY, Coach-Builders, 269 *Oxford Street*, London.—A light elliptic spring coach.

Exhibitors in the Great Exhibition, 1851; obtained Prize Medal at the Paris Exhibition, 1855.



AN ELLIPTIC SPRING COACH.

[1451]

WINDOVER, C. S., *Huntingdon*.—Carriage adapted for the four seasons. (*See pages 60 and 61.*)

[1452]

WOODALL & SON, *Orchard Street*, London, W.—A superior side-light coach, with improvements in ventilation.

[1453]

WOODBOURNE, JAMES, *Park Ironworks*, *Kingsley*, near *Alton*, *Hampshire*.—Improved model cart for general purposes.

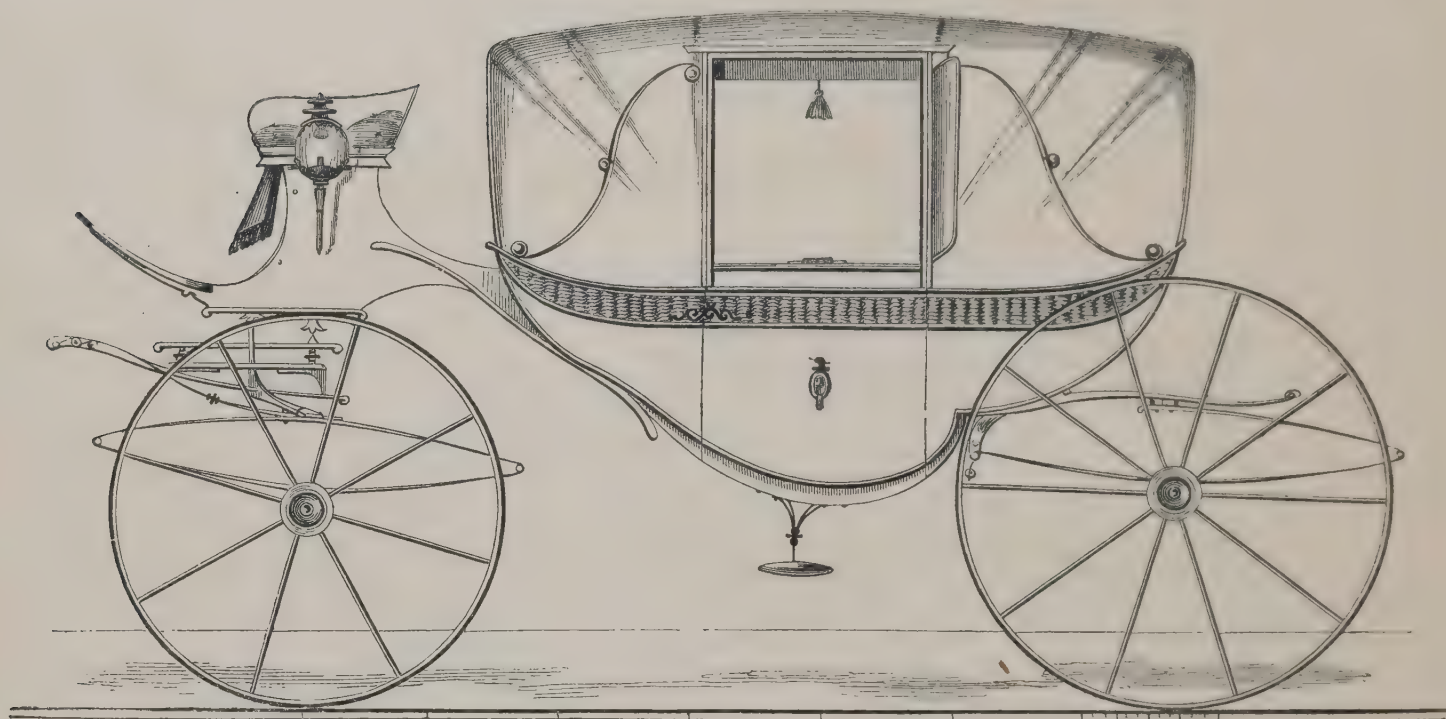
[1454]

WYBURN & Co., 121 *Long Acre*.—A landau and a brougham. (*See pages 62 and 63.*)

WINDOVER, CHARLES SANDFORD, *Huntingdon*.—A carriage adapted for the four seasons, forming a barouche, sociable, coach, and landau.

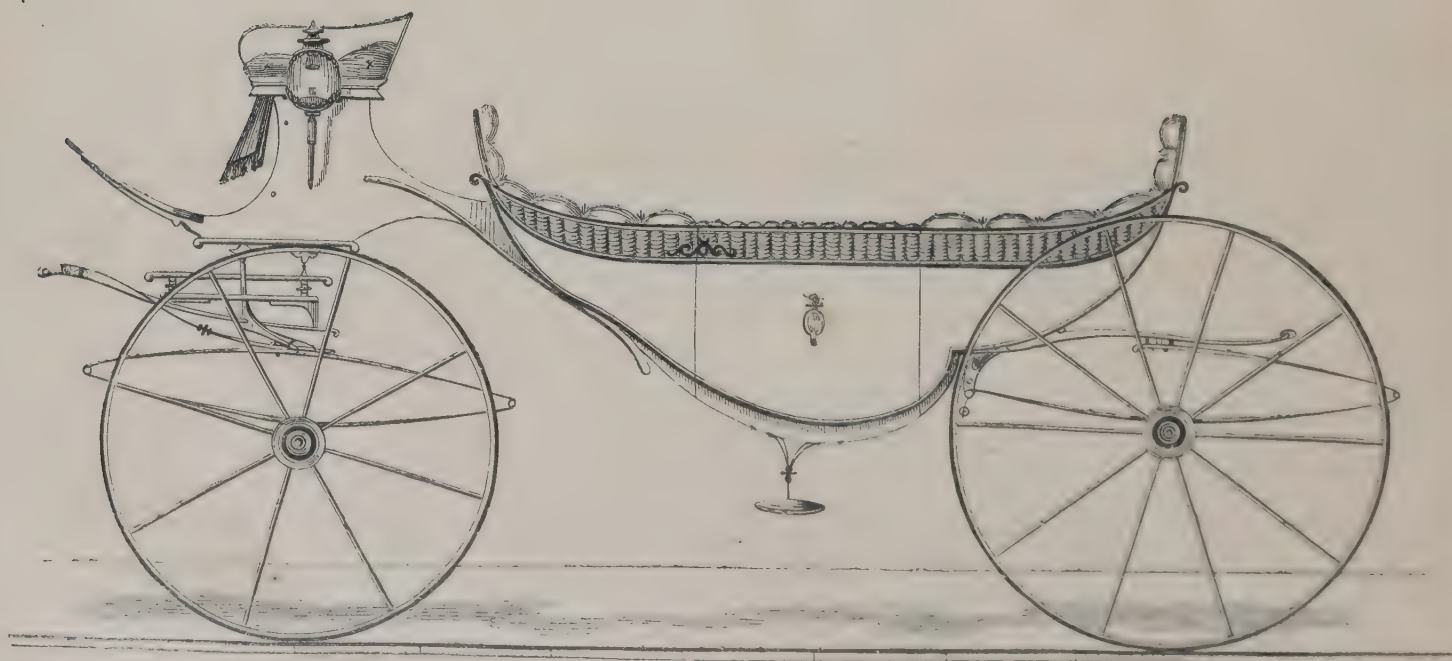
WINDOVER'S REGISTERED TESSATEMPORA,

The only Convertible Carriage adapted for the four Seasons.



SPRING.

Price from 160 to 200 Guineas.



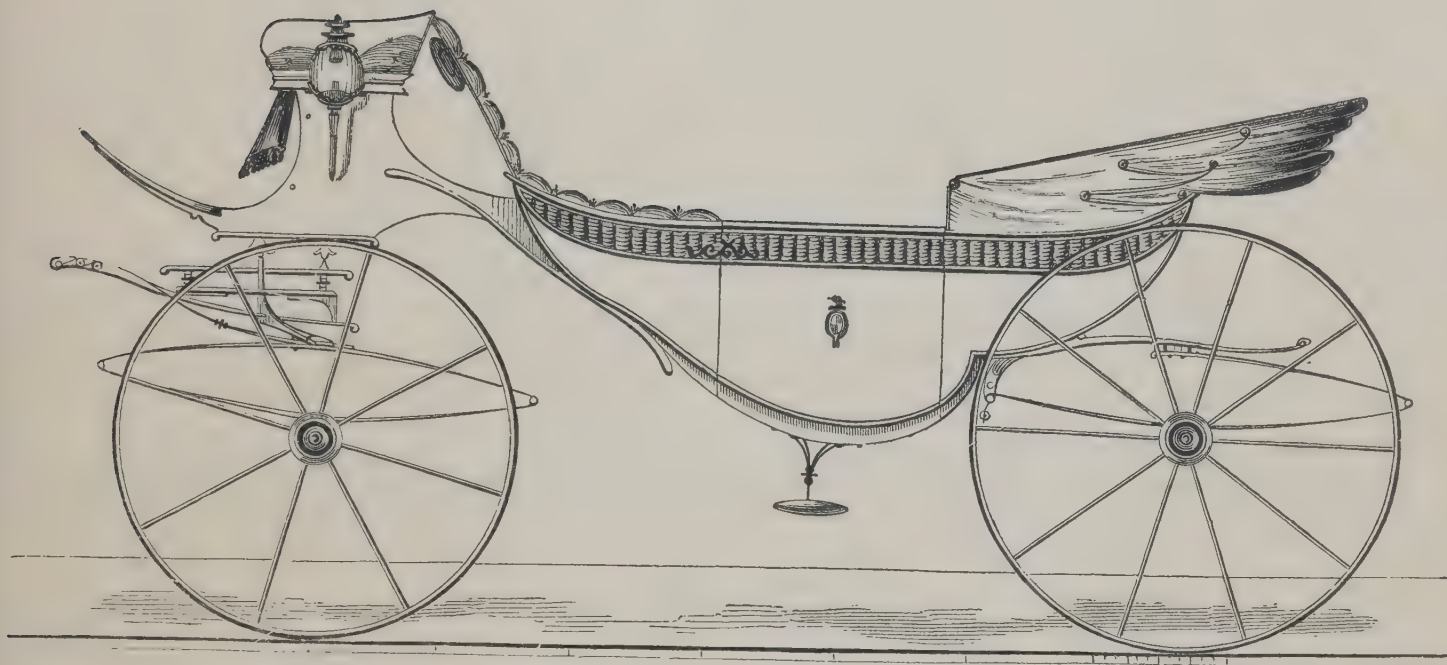
SUMMER.

Price from 115 to 135 Guineas.

WINDOVER, CHARLES SANDFORD—*continued.*

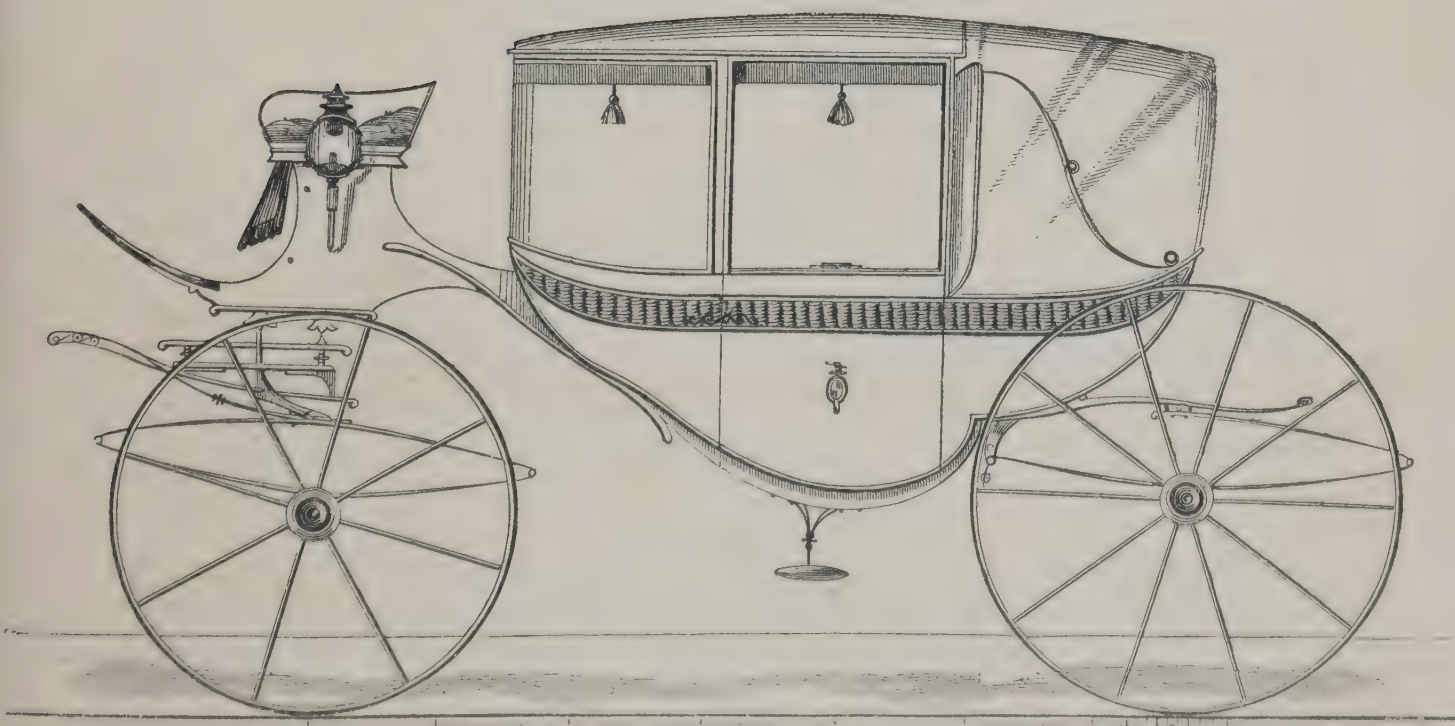
WINDOVER'S REGISTERED TESSATEMPORA,

The only Convertible Carriage adapted for the four Seasons.



AUTUMN.

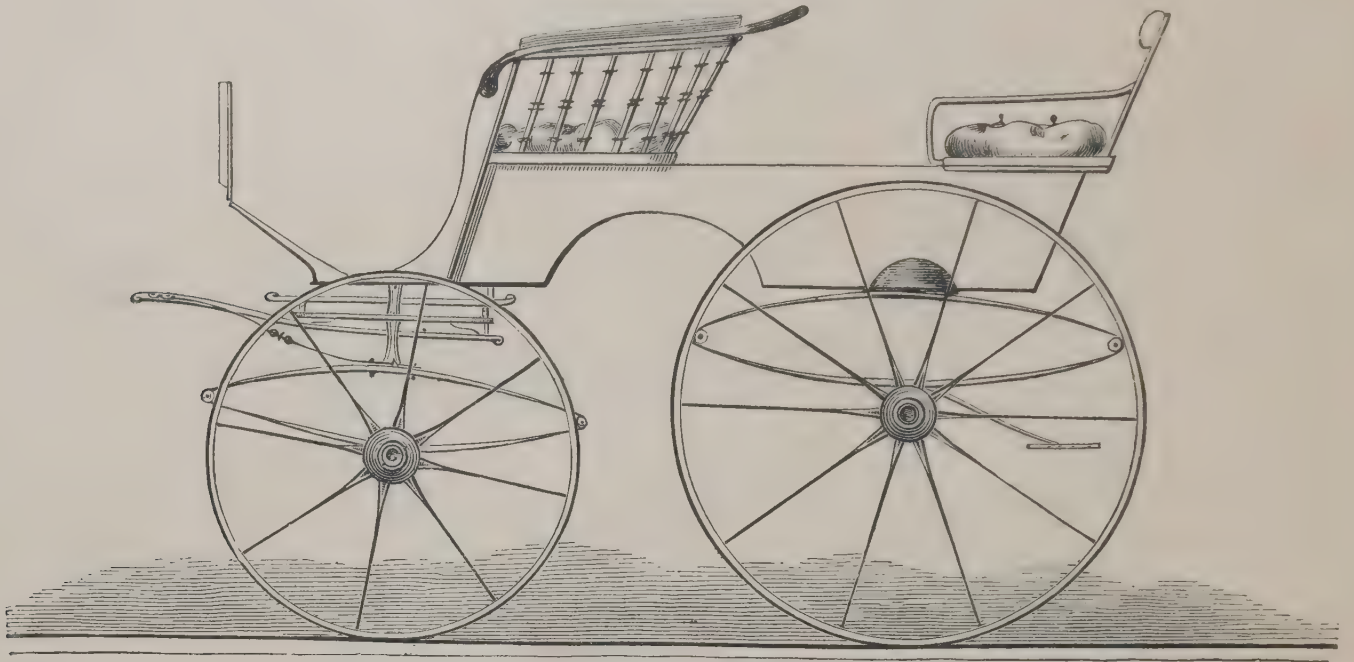
Price from 135 to 160 Guineas.



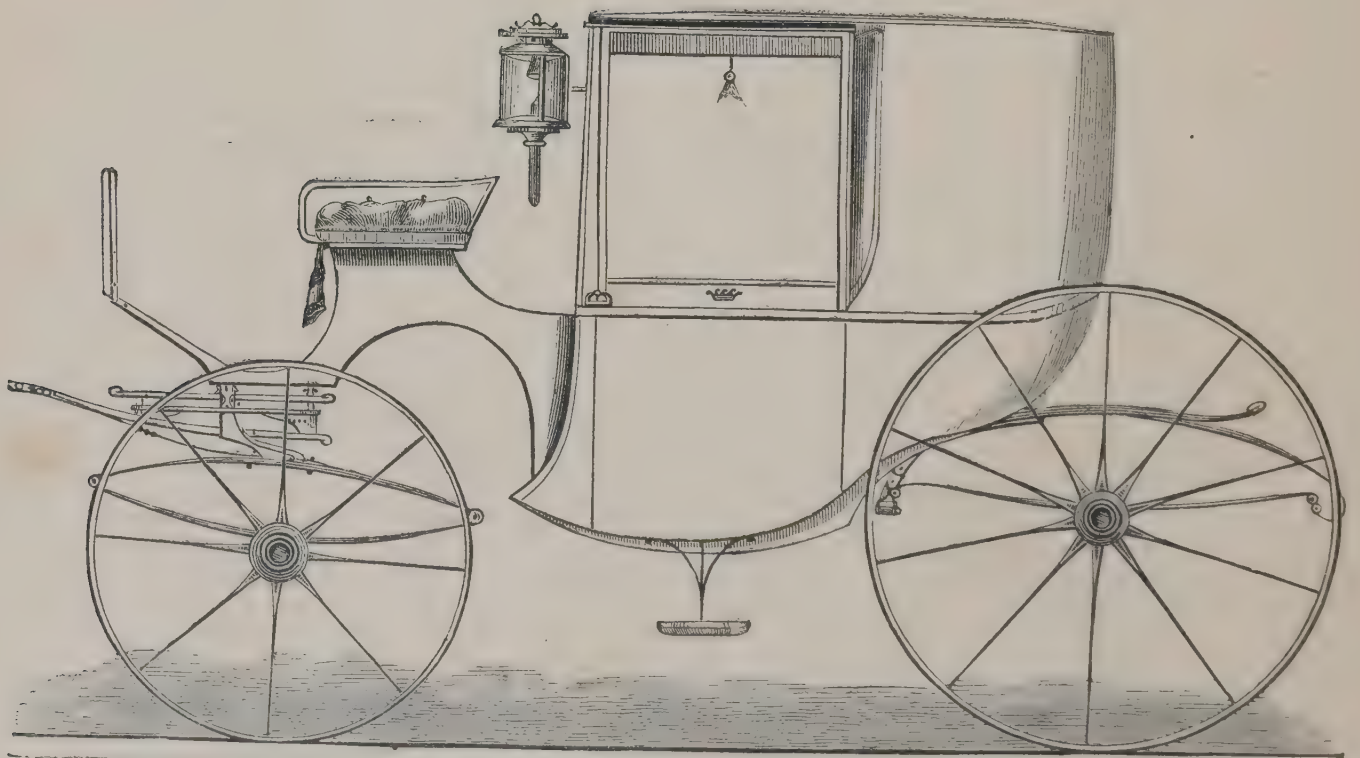
WINTER.

Price from 165 to 205 Guineas.

WYBURN & Co., Her Majesty's Coachmakers, 121 Long Acre, W.C.—A phaeton, a landau, and a brougham.

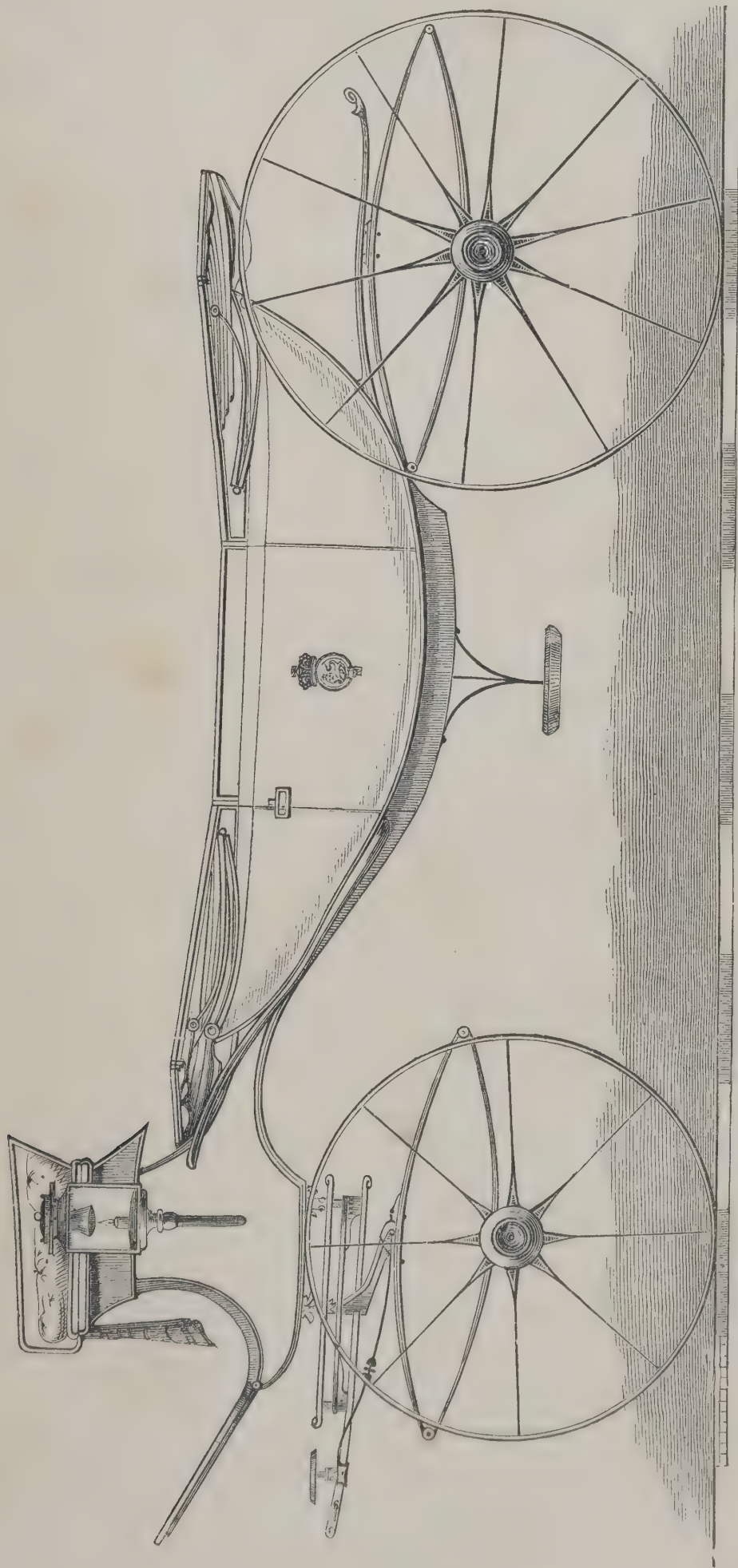


A PHAETON.



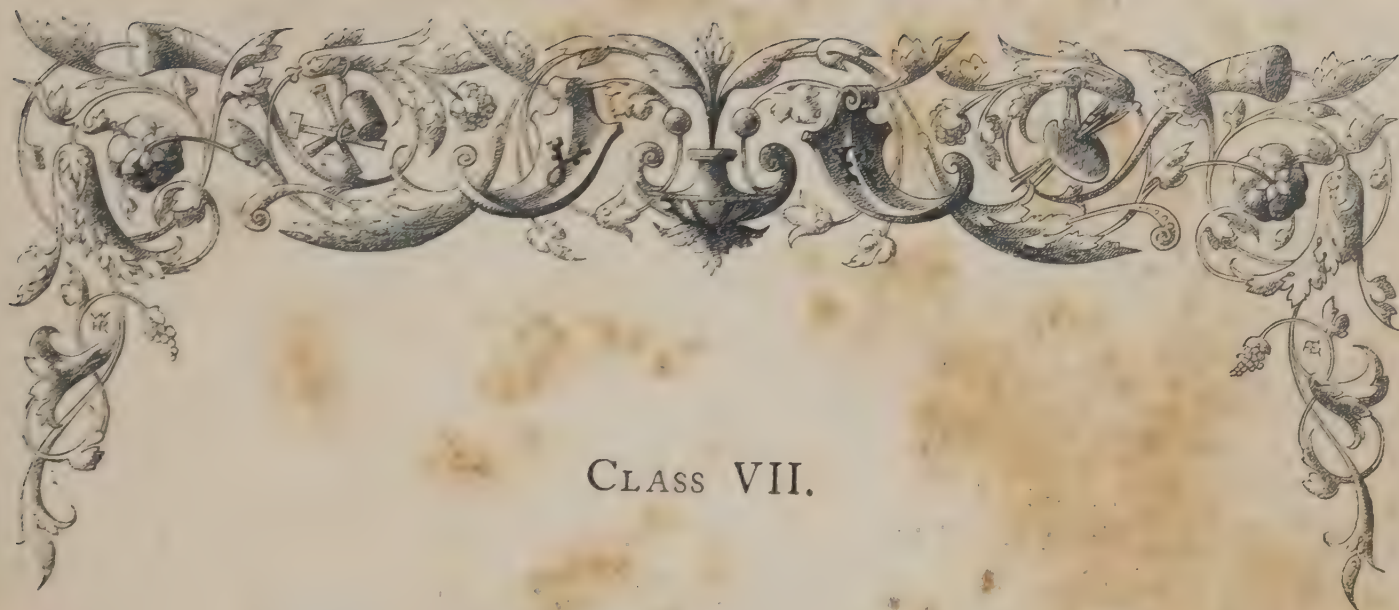
A BROUGHAM.

WYBURN & Co.—*continued.*



A LANDAU.

PRINTED FOR HER MAJESTY'S COMMISSIONERS
BY
SPOTTISWOODE AND CO., NEW-STREET SQUARE, LONDON



CLASS VII.

MANUFACTURING MACHINES AND TOOLS.

SUB-CLASS A.—*Machinery employed in Spinning and Weaving.*

[1486]

ANDERSTON FOUNDRY COMPANY, *Glasgow*.—Looms for weaving checked and fancy goods.

[1487]

APPERLY, JAMES, & Co., *Dudbridge, Stroud*.—Oiling, feeding, carding, condensing, grinding mills.

[1488]

BOOTH, JOSEPH, *Rock Street, Bury, Lancashire*; THOMAS WILLIAM CHAMBERS, 96 *Georgiana Street, Bury, Lancashire*; JAMES CHAMBERS, 100 *Georgiana Street, Bury, Lancashire*.—Loom for weaving; improved letting off, taking up, picking, and shedding motions, and reed-holder.

UNDERPICK LOOM, 36 in. reed space, can be made any width required, with letting off, picking, taking up, shedding, fast and loose reed motions, all new: with plain tappets and temple, suitable for calicoes, twills, domestics, &c. which by a simple arrange-

ment are suitable also for gingham, checks, plaids, &c. This loom may be worked safely at 250 picks per minute. Any of these motions can be applied to other looms. Prices and lithographs may be obtained free, by application to the makers, Tuer & Hall, Bury, near Manchester.

[1489]

CLARKE, I. P., *Leicester*.—Reels, spools, and mill bobbins for cotton, silk, and linen thread.

[1490]

CLARKE, T. A. W., *Leicester*.—Machine for covering india-rubber rings.

[1491]

COMBE, JAMES, & Co., *Belfast*.—Flax machinery.

[1492]

COOK & HACKING, *California Iron Works, Bury, Lancashire*.—Self-acting heald-knitting machine.

This newly patented heald-knitting machine is entirely self-acting, simple in construction, requires little attention, and knits healds of any description with

great rapidity. It may be seen in the machinery department of the Exhibition, or at Cook & Hacking works, Bury, Lancashire.

[1493]

COTTON SUPPLY ASSOCIATION, *Manchester*.—Indian native churka, and improved roller-gin for cleaning cotton.

[1494]

CRABTREE, THOMAS, *Halifax, Yorkshire*.—Card-setting machinery.

[1495]

DAVIS, EDWARD, & JOHN, *Leeds and Derby*.—Yarn tester.

[1496]

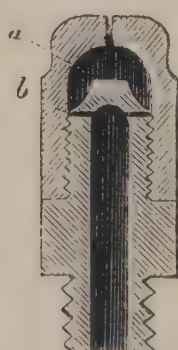
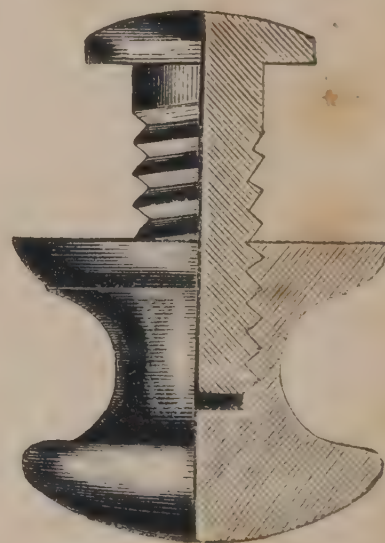
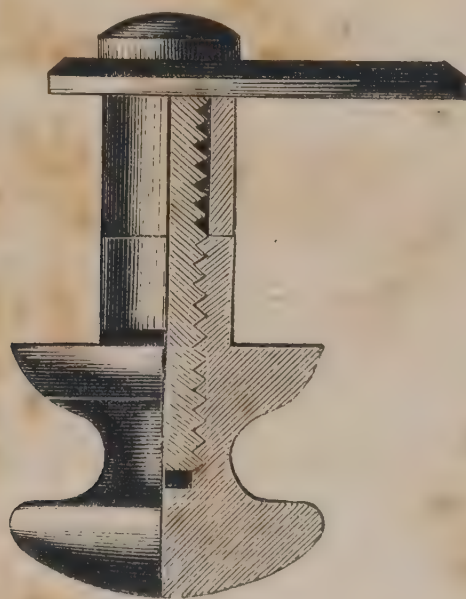
DE BERGUE, S., *Manchester*.—Reeds for weaving; brass, iron, and steel dents for the same; steel wire for crinolines.

[1497]

DICKINSON, WILLIAM, & SONS, *Phoenix Iron Works, Blackburn*.—Loom for fancy weaving; fast loom, Taylor's patent; power loom with dobby, &c. (*See page 3.*)

[1498]

DIXON, JOHN, & SONS, *Steeton-in-Craven, Leeds*—Bobbins, rollers, keys, tree-nails, drawer knobs, and boxes.



a Chamber for gas before passing through ordinary slit in caps of burner.

b Lateral openings for filling chamber *a*, their direction being at an angle with, or across the opening in cap of burner.

The following articles manufactured by Dixon & Sons are also exhibited:—

Turned pill and powder boxes and cases.

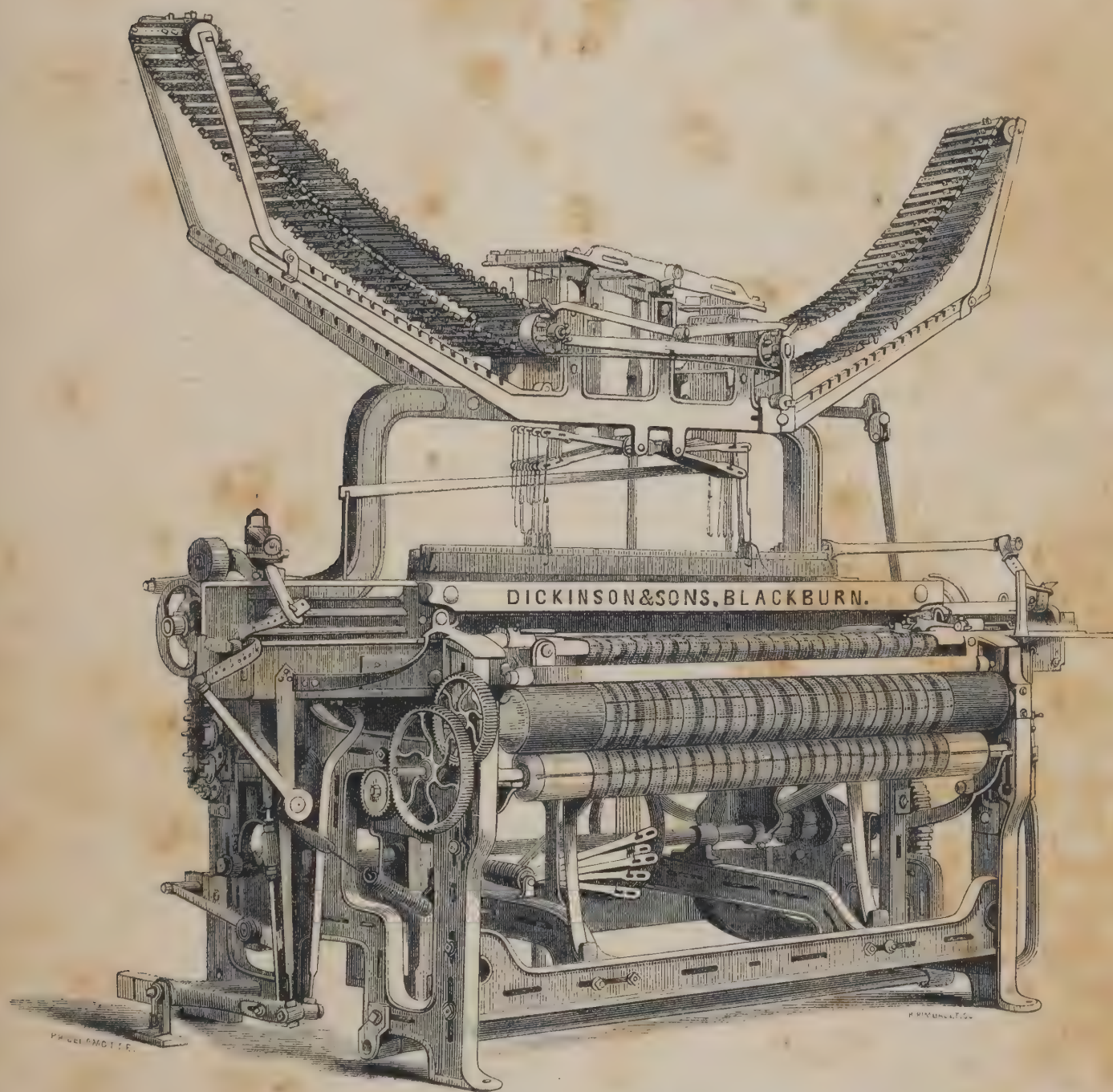
Heywood & Dixon's patent knobs and handles.

Oldfield & Dixon's patent gas burners.

[1499]

DOBSON & BARLOW, *Bolton, Lancashire*.—Machinery for opening and cleaning, preparing and spinning cotton. (*See page 4.*)

DICKINSON, WILLIAM, & SONS, *Phoenix Iron Works, Blackburn.*—Loom for fancy weaving; fast loom, Taylor's patent; power loom with dobby.



POWER LOOM.

The Exhibitors are patentees of improvements in looms; the inventors of the Blackburn system, or over-pick motion for looms; and original makers of sizing and warping machines.

MACHINERY EXHIBITED IN OPERATION.

POWER LOOM with multiple shuttle box and dobby combined, for weaving checks, gingham, diapers, velvets, linsey-wolseys, &c.

POWER LOOM with Taylor's patent, for weaving plain and fancy twills, spots, satin checks, figured scarfs, &c. &c.

DOBBY LOOM with Taylor's patent, for weaving India scarfs.

MACHINERY EXHIBITED NOT IN OPERATION.

IMPROVED SIZING MACHINE (see Testimonials).

MACHINERY NOT EXHIBITED (see Drawings).

WINDING MACHINES for throstles or cops; warping machines for improved sizing machine, winding-on or beaming machines, &c. &c.

Spinning and weaving mills are estimated for, completed, and put to work by this firm on the most improved system.

DOBSON & BARLOW, *Bolton, Lancashire*.—Machinery for opening and cleaning, preparing and spinning cotton.

COTTON-SPINNING MACHINERY IN FULL OPERATION.

A COMPLETE SYSTEM of COTTON-SPINNING MACHINERY, especially adapted for preparing and spinning fine numbers of yarn, and consisting of the following machines; viz. :—

1. COTTON OPENER of an improved construction, adapted for opening and cleaning long or short stapled cotton, the feeding parts and the inside gratings being of an entire novel construction, the object being to open and clean the cotton without injuring the staple. It can be made with either up or down drafts.

2. SINGLE SCUTCHER with lapping parts, with Dobson & Barlow's patent feed rollers, which hold the cotton sufficiently firm without crushing the seeds or shells. The feed table is so arranged as either to spread on or to double 4 laps.

3. BREAKER CARDING ENGINE. This is a compound patent of Dobson & Barlow, and Geo. Wellman of the United States, America. Its chief features are that the cotton is well opened and cleaned by the working rollers, before the upper roller will allow it to pass to the self-stripping top flats; these flats can be taken out at pleasure, without the use of a screw key, and are easily set.

4. A FINISHER CARDING ENGINE, with Wellman's patent self-stripping apparatus. This is the only perfect automaton stripping motion for the ordinary flats: they have hitherto been stripped by hand.

5. ASHWORTH'S PATENT LAP MACHINE, for making laps for the finisher carding engine, and combing machine, from slivers produced by the breaker card; the plates at each end of the lap revolve with it, and prevent the edges from being felted together as hitherto.

6. GRINDING MACHINE for grinding two rollers and a flats at a time.

7. DRAWING FRAME of three heads of three deliveries each, adapted for either fine or coarse work, with stopping motions, both at back and front, to prevent waste or roller lap.

8. SLUBBING FRAME of forty-four spindles, 10 by 5 in. press bobbin, with improved changing motions, and adapted for either fine or coarse numbers.

9. INTERMEDIATE FRAME of fifty-four spindles, 8 by 4 in. press bobbin, with improved changing motions, and adapted for either fine or coarse numbers.

10. ROVING FRAME of seventy spindles, 7 by 3½ in. press bobbin, with improved changing motions, and adapted for either fine or coarse numbers.

11. JACK FRAME of eighty-eight spindles, 5 by 2½ in. soft bobbin, with tapering motion, improved changing motions, and especially adapted for fine numbers; these frames are made so as to produce a fifty or sixty hank roving if desired.

12. DOBSON & BARLOW'S PATENT SELF-ACTING MULE, adapted for either fine or coarse numbers, made with double speed when required; the patent stretching motion is well adapted for fine numbers, not requiring any change of gear when the rollers stop, thus insuring perfect steadiness in the carriage and freedom from strain on the yarn. The changing motions are positive in their action and liable to little wear and tear. Their recently patented improved winding on quadrant (which is perfectly self-acting and independent of the workman) ensures the yarn being properly wound on at the nose of the cop.

These mules are made to drive from either above or below, or with or without driving apparatus, and are adapted to spin any number from 1s. to 150s.

[1500]

DUGDALE, JOHN, & SONS, *Soho Foundry, Blackburn*.—Loom for twilled cloth; loom for plain cloth; cop winding machine.

COP WINDING MACHINE.

FAST REED POWER LOOM, for weaving heavy twilled cloth.

LOOSE REED POWER LOOM for weaving light fine cloth, with Dugdale's patent shedding motion attached, which enables the loom to run quicker, sturdier, and with more

ease to the yarn and healds, than the ordinary make of looms.

DUGDALE'S PATENT CONTRACTING COLLARS for roving machines, mule and throstle spindles, which by a novel arrangement for contracting the collar, when it or the spindle becomes worn, enables the spindle to run quicker with less vibration.

[1501]

FAIRBAIRN, P. & SONS, *Leeds*.—Rope spinning machinery.

[1502]

FERRABEE, JAMES, & CO., *Stroud, Gloucestershire*; and 75 and 76, *High Holborn, London*.—Machines for forming bats of fleece, fulling and shearing woollen cloth.

WOOLLEN MACHINERY EXHIBITED.

FERRABEE'S PATENT MACHINE FOR FORMING BATS OF FLEECE in connexion with scribbling or carding machines, and for other purposes.

A PERPETUAL SHEARING MACHINE, adapted for finishing the cutting of fine woollen cloths.

FERRABEE'S PATENT FULLING MACHINE, adapted for woollen goods which vary in bulk and character; intended to obviate wrinkling in the process of fulling.

[1503]

GATENBY & PASS, *Manchester*.—Reeds, dents, dent wire, &c., for weaving textile fabrics, also crinoline wire.

[1504]

GORDON, J., 3 *Billiter Square, London*.—Roller gin for cleaning cotton, worked by the foot.

[1505]

HALEY, JONAS, & SONS, *Cloth Hall Machine Works, Dewsbury*.—Improved rag grinding machine.

[1506]

HARDING, T. R., *Leeds*.—Card clothing, &c.

[1507]

HARDING, T. R., *Leeds*.—General mill furnishings.

[1508]

HARRISON, J., & SONS, *Blackburn, Lancashire*.—Looms and other weaving machinery for cotton, linen, &c. (*See pages 6 and 7.*)

[1509]

HATTERSLEY, GEORGE, & SON, *North Brook Works, Keighley, near Bradford*.—Two looms for weaving fancy goods.

[1510]

HENDERSON & CO., *Durham*.—Power-loom for weaving Brussels and velvet carpets.

[1511]

HETHERINGTON, JOHN, & SONS, *Vulcan Works, Manchester*.—Cotton cleaning, preparing, combing, and spinning machinery. (*See pages 8 and 9.*)

[1512]

HEWKIN, HENRY, *Oldham, Lancashire*.—Model of the Oldham Building and Manufacturing Company's cotton-mills.

[1513]

HIGGINS, WILLIAM, & SONS, *Manchester*.—Patent cotton machinery, automatic carding engines, drawing, roving frames, and throstle.

[1514]

HINE, RICHARD E., & CO., *Manchester*.—Machine for spinning, doubling, and twisting silk and other threads, wet or dry.

[1515]

HODGSON, GEORGE, *Bradford*.—Looms, with improvements up to the present time. (*See page 11.*)

HARRISON, J., & SONS, *Blackburn, Lancashire.*—Looms and other weaving machinery for cotton, linen, &c.

WINDING MACHINE for winding cotton yarn from the cop on to spools or bobbins, commonly called “warper’s bobbins,” for the purpose of warping or beaming.

This machine has an arrangement on one side for winding cotton or linen yarn from “Throstle bobbins” on to warpers’ bobbins, and can be made of any number of spindles.

The spindles are arranged in such a manner that they are always kept on a level with each other.

The motion for shaping the bobbin is a very simple eccentric or “heart,” by means of which the bobbin can be filled up in any form.

WARPING MACHINE, on Knowles & Blackburn’s patent, to wind the yarn from the warpers’ bobbins on to beams for the sizing or dressing machine.

This machine is made on an entirely new principle; the rollers run on centres instead of on bearers as heretofore, thereby greatly diminishing the tension on the yarn and in a very great measure obviating breakages, the production being increased in the same ratio as the breakages are lessened. It is also supplied with a letting-back motion, whereby when a thread is broken, the motion of the beam or roller is reversed, so that the thread may easily be found and reunited. There is also a self-acting measuring and stopping motion by means of which the machine is immediately stopped when the required length of yarn is wound on the beam.

The drum or cylinder on which the beam revolves, is made in such a manner that it may be expanded or contracted according to the width of beam required to be used. Among other improved appliances is Messrs. Knowles & Blackburn’s patent expanding and contracting comb.

This improved machine is capable of working more delicate yarn, and yarns of lower qualities, than other machines of the kind, and will in this respect effect a considerable saving. It is also very applicable to silk.

SIZING MACHINE, commonly called SLASHER, for sizing or dressing, and afterwards drying the warp preparatory to being woven.

In this machine the yarn is brought from the warpers’ beams through the boiling size, and over drying cylinders, after which it is wound on the weavers’ beam. The use of the heald and reed is dispensed with, thus facilitating the management of the machine, and causing a saving of between 40 and 50 per cent. in the cost of labour. There is an arrangement for working the machine by friction, and for preventing any tension being put upon the yarn whilst in a wet state. Its elasticity is thus retained, and breakages in weaving almost altogether prevented,

causing considerable increase in the production. By this arrangement coarse and fine yarns can be sized with equal facility, as also yarns of medium and low qualities.

There are syphon boxes for the purpose of condensing the steam as it comes from the drying cylinders; or they can be connected with the size box by means of steam pipes, and the exhaust steam from the cylinders introduced into the size box for the purpose of boiling the size. In this manner *no* steam is wasted. Safety valves, to regulate the pressure of the steam previous to its passing into the drying cylinders, and also a safety valve to “blow off” should the pressure of steam accidentally get too high. There is an arrangement for letting out any water that may accumulate in the cylinders.

The cylinders themselves are made on an improved principle, with an aperture or manhole in the end of each, covered by movable plates, which can easily be removed to allow the cylinders to be cleaned out or repaired, and can with equal facility be replaced. The joints of these plates are perfectly steam-tight, and the manner of their application rather adds to than detracts from the strength of the cylinders.

Another arrangement of very great importance is that by means of which, simultaneously with the stoppage of the machine (at any time), the steam is shut off from the cylinders. The machine is also fitted up with Messrs. Knowles & Blackburn’s patent expanding and contracting comb or rathe.

The production is about 100,000 yards of warp per week, or sufficient to supply at least 300 looms.

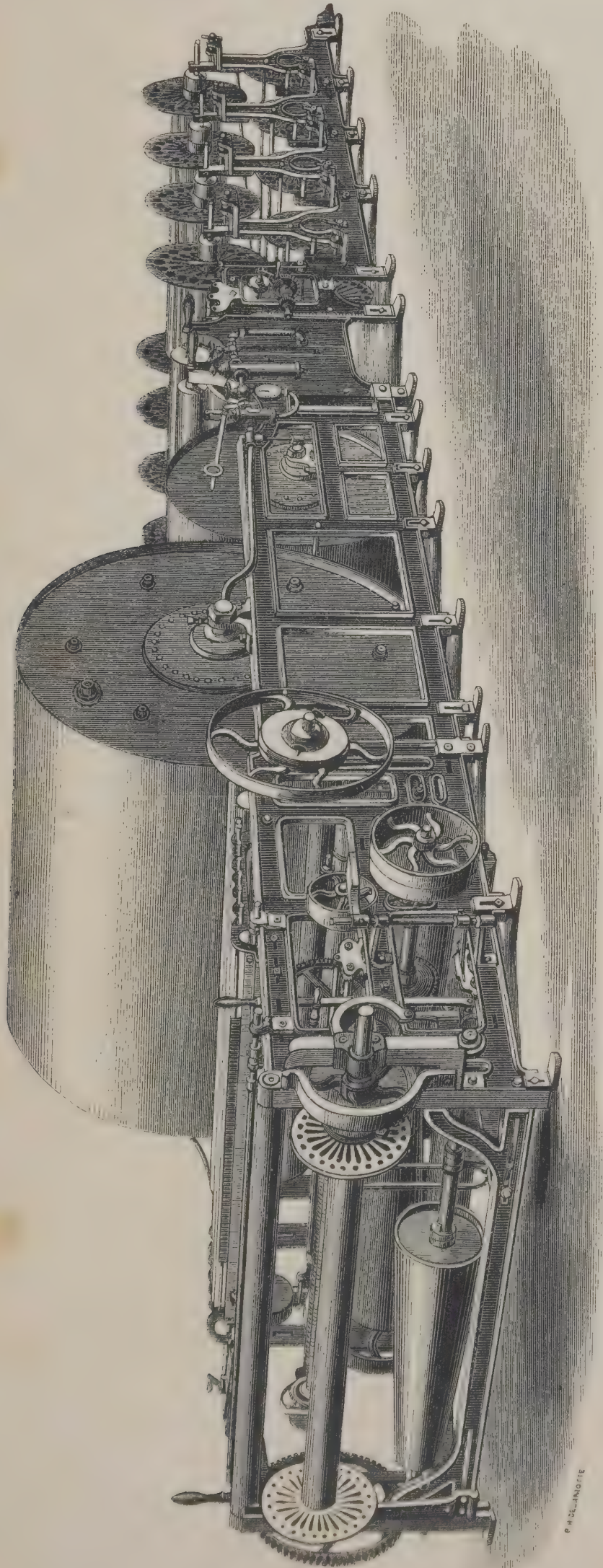
The machine can be made to dress warps suitable for any width of cloth.

LOOM for weaving calicoes, shirtings, and printing cloths, also cambrics, jacconets, &c.; with self-acting temple to keep the cloth stretched to its full width whilst being woven. Self-acting positive taking-up motion for receiving or rolling-up the cloth.

The taking-up roller in this loom is composed of sheet-iron covered with composition. This roller always presents a perfectly level surface to the cloth, being on this account much superior to the ordinary wooden roller covered with emery, the disadvantage of which is, that it changes with the temperature—in damp weather becoming swollen, and in dry weather “warped” or crooked, causing great irregularity in the cloth.

This loom is also supplied with the weft stopping-motion, causing an instantaneous stoppage of the loom when the weft or shoot breaks or is absent. Metallic picking motion for propelling the shuttle. The advantages of this picking motion are greater durability and precision.

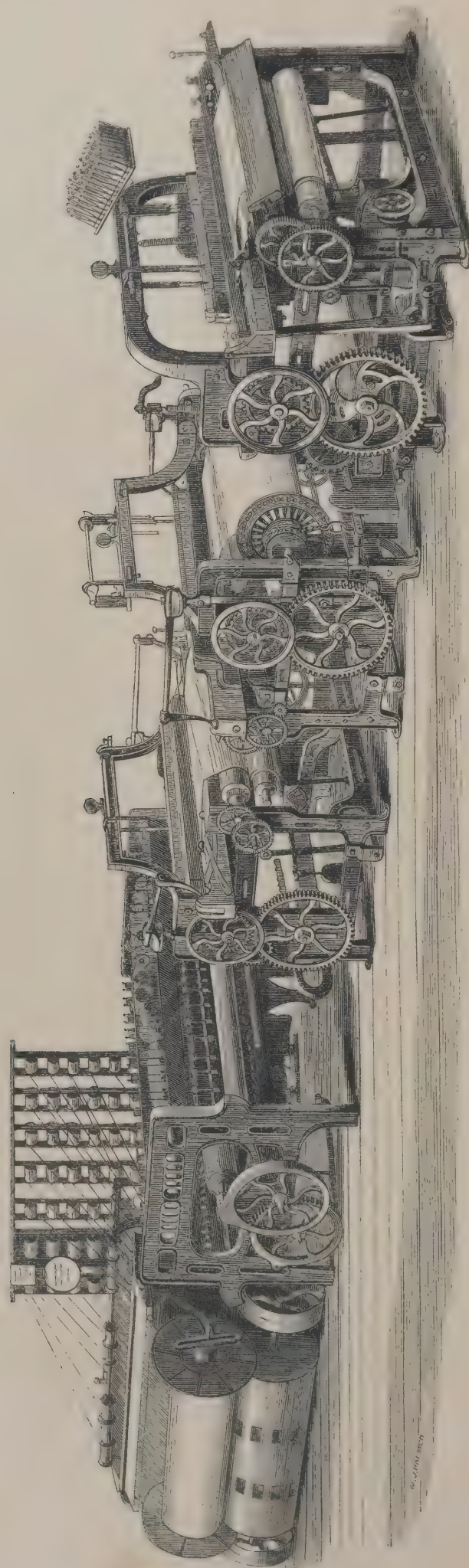
HARRISON, J., & SONS, *continued.*



SLASHER-SIZING MACHINE BY J. HARRISON AND SONS.

P. & S. HARRISON

HARRISON, J., & SONS, *continued.*



LOOM FOR LINENS.

LOOM FOR "DOMESTICS" AND
HEAVY COTTON GOODS.

LOOM FOR LIGHT AND
MEDIUM COTTON GOODS.

WINDING MACHINE.

WARPING MACHINE.

HARRISON, J. & SONS, *continued.*

Patent treading motion, by means of which a saving of upwards of 25 per cent. in wear and tear of “healds” or “heddles” is effected, and which conserves in a superior degree the “nap” or “cover” of the cloth.

This loom is on the loose-reed principle, and capable of being worked at a speed of 350 to 400 “picks” per minute, being double the usual speed. It can also be arranged to weave twilled and fancy cloths.

LOOM for weaving heavy domestics’ twilled goods, and strong drills and tweeds.

This loom is on the fast-reed principle. It combines all the advantages of the above loom, together with modifications and arrangements necessary for weaving strong goods. It has a cast-iron taking-up roller, fluted and chased, and a patent break; also an improved appliance for preventing strain on the warp threads when the weft is being “beaten up.”

LOOM to weave linens.

This loom combines many important improvements. It is supplied with patent self-acting positive letting-off motion, which delivers the warp as required by the taking-up motion for the cloth, which motion is also positive. These two motions work in concert, and with such precision, that the warp is delivered from the yarn beam with the same regularity when the beam is almost empty as when it is full.

The taking-up roller of this loom is covered with patent surfacing instead of emery. It is also supplied with the weft-stopping motion and other important appliances.

The yarns woven in this loom are spun by Messrs. Johnston and Carlisle, of Belfast.

In all these looms the cranks are made of one piece of iron, and bent by graduated pressure. The fibre of the iron by this process remains undisturbed, and renders the crank much stronger than when welded in the usual manner. The bend of the crank, which has heretofore been the weakest part, is now as strong as any other part of it.

Besides the above machines, J. Harrison and Sons, are makers of:—

KNITTING MACHINES on an improved principle, for knitting healds or heddles by power, by means of which a superior quality of heald is produced, with none of the irregularity which occurs in hand-made healds. Another important advantage in this machine is a saving of 50 per cent. in the cost of production.

FOLDING OR PLAITING AND MEASURING MACHINES by power, for measuring the cloth and laying it in folds after it comes from the loom, and previous to being put in bales or bundles.

This machine folds and measures the cloth with the greatest regularity and precision, and effects a very important saving in this department.

CLOTH PRESSES to press the cloth after it has been put into bundles.

DRUM WINDING MACHINES to wind cotton or linen yarns from the hank on to the warper’s bobbins or spools.

WARPING MACHINES, specially adapted for linen yarns, with weighting motion, presser, &c.

DRESSING MACHINES on the Scotch principle, to dress and dry linen yarn, preparatory to being woven; with circular or sweep brushes and fans, steam chests, and organ pipes for drying the yarn.

SPOOLING OR PIRNING MACHINES, to wind linen and cotton yarns from the hank or from the bobbin, on to pirns or spools for the shuttle.

LOOMS on an improved principle, to weave fustians, beverteens, &c. with Woodcroft’s patent section tap-pets, positive taking-up motion, self-acting temples, and other improvements.

WINDING MACHINES, suitable for winding yarns for fustian warps, on the best principle.

WARPING MACHINES, for fustian yarns.

SIZING MACHINE, specially adapted for sizing or dressing fustian warps, combining the systems of the sizing machine, and the dressing machine on the Scotch principle, with all their advantages.

LOOMS to weave worsted goods, plain and fancy.

WARPING MACHINES, specially adapted for silk.

LOOMS to weave silk on the newest and most approved principle, with spring reed, &c.

J. Harrison & Sons also supply every accessory connected with the weaving of cotton, linen, &c. &c.

HETHERINGTON, JOHN, & SONS, *Vulcan Works, Manchester.*—Cotton cleaning, preparing, combing, and spinning machinery.

MACHINES EXHIBITED.

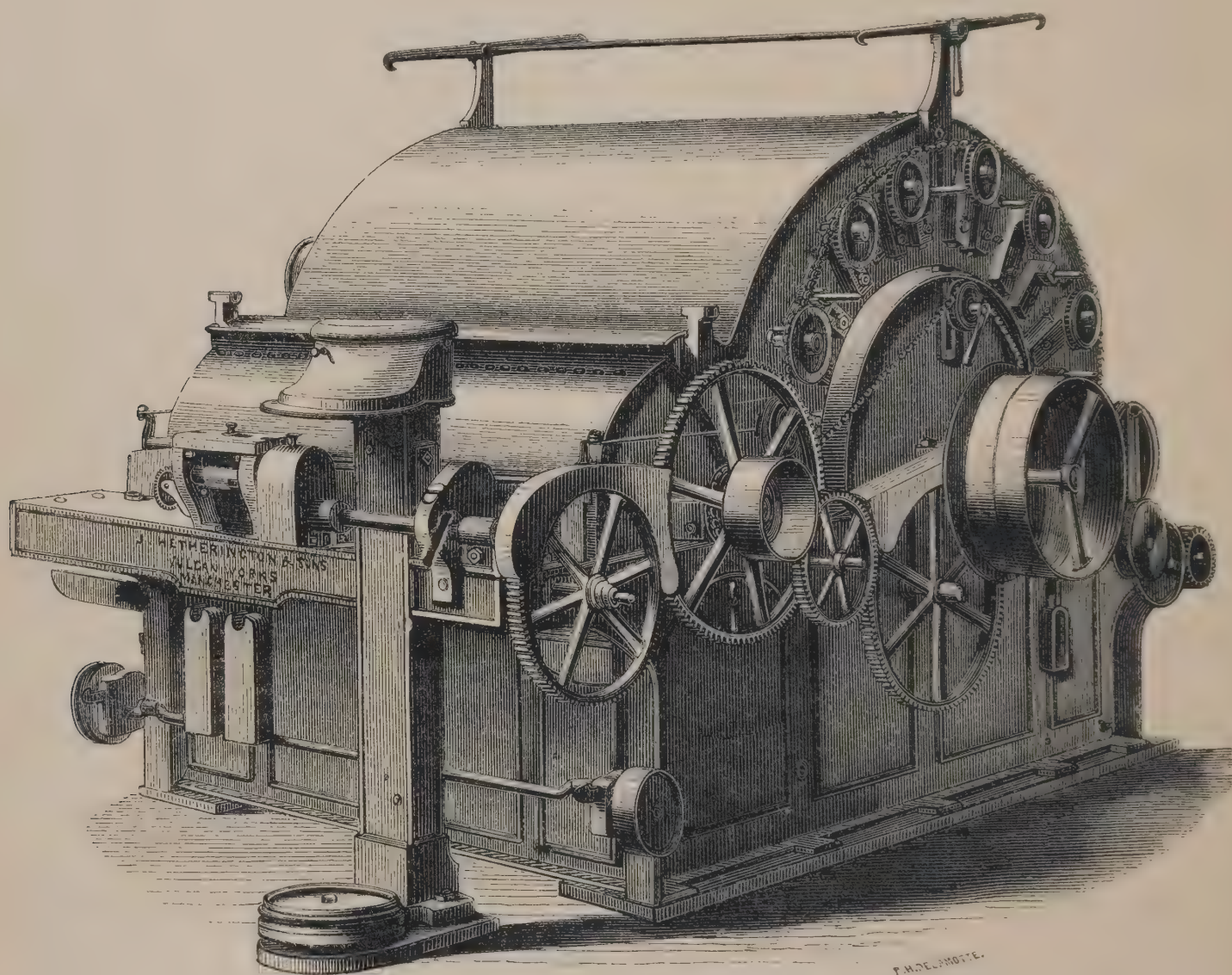
A SINGLE SCUTCHING MACHINE, suitable for making laps for 40-in. cards, with enlarged fan, and improved grid bars and beater, specially adapted for surats or leafy cotton, previously opened in their improved opening machine with four porcupine beaters.

THREE CARDING ENGINES, each 40 in. on the wire :—

1. CARDING ENGINE, with main cylinder 45 in. diameter, doffer 22 in. diameter, 6 working rollers, 6 clearers with draw-box and coiling motion ; also 3 takers-

in, with self-acting apparatus for working the lower one at variable speeds, so that when at the maximum speed it strips or cleans the main cylinder. This card is also fitted with improved doffing knife, and also under casings for saving the fly.

2. CARDING ENGINE, with main cylinder 40½ in. diameter, doffer 18 in., with rollers, clearers, and taker-in, combined with patent self-stripping flats, arranged to be cleaned by a brush. The frequency with which the flats are cleaned may be varied to suit the class of cotton used. It has also an improved doffing knife.



CARDING ENGINE.

3. CARDING ENGINE, with main cylinder, doffer, and taker-in. In this card, two new and important improvements (Rivett's patent) are exhibited—First; a novel method of making the rollers revolve with a peculiar advancing and receding movement, which facilitates their being stripped by a stationary comb or knife. Second; an improved means of stripping or cleaning the main cylinder, which by the arrangement of mechanism is self-acting, and brought into operation at certain intervals as desired. The main cylinder has a reverse motion applied to it, and a revolving brush is brought into contact with it, which thoroughly brushes out the wire on the cylinder.

These three cards have been selected to show some of the most recent improvements, but any of these motions is either applied singly to the usual card, or otherwise modified and combined with each other.

DRAWING FRAME of 1 head or 4 deliveries, with coiling motion and stop motion at the back, and also at the front for stopping the machine when either the feeding or delivery is deranged.

These machines are made with any required number of heads, and deliveries in each head.

SLUBBING FRAME of 60 spindles, 10 by 5 in. bobbin, with 3 lines of rollers, and single centrifugal presser.

ROVING FRAME of 120 spindles, 7 by 3½ in. bobbin, with 3 lines of rollers, and single centrifugal presser.

These machines are made with increased length of spindle, and reversed bottom rail, so as to reduce the height of the frame; and they have cones of increased size, with an arrangement adapted for extra long strap.

HETHERINGTON, JOHN, & SONS, *continued.*

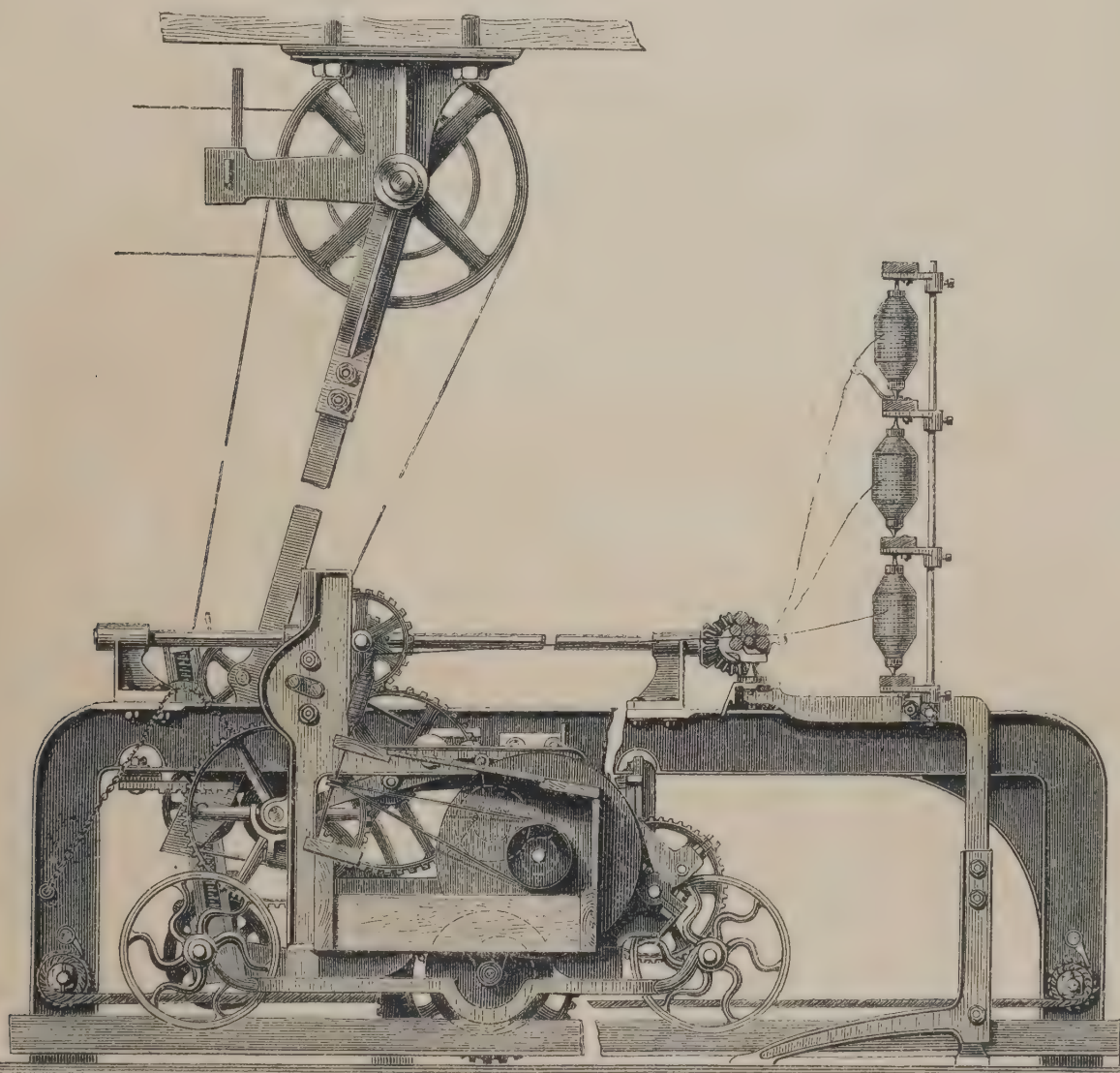
These may be taken as examples of this class of machines—they are made with various numbers of spindles, and the size of bobbin is adapted to suit various numbers of yarns, and ranges from 11 by 5 in. to 4 by 2½ in. accordingly.

THROSTLE FRAME of 232 spindles, 2 in. lift; the spindles are driven by bands from 2 tin cylinders, but are made to be driven by bands from single tin cylinder; or when required, by list or tapes from single tin cylinder and carrying pulleys.

These frames are made with various numbers of spindles and sizes of bobbins, and the doubling frame usually employed for making sewing thread or other doubled yarn is a modification of this machine.

SELF-ACTING MULE, Hetherington & Robertson's patent, with 400 spindles, but they may be made with any number of spindles up to 1,200 in each mule.

This mule is shown in the annexed woodcut, and is distinguished by its simplicity of construction, less power required for driving it, regularity of twist in the yarn,



SELF-ACTING MULE.

increased production, and economy in working. The power is transmitted direct to the tin cylinder, and from thence force for propelling the various motions is distributed. The rim band, as used in other mules, and through which the greater proportion of the power required has to pass, is dispensed with, and a considerable expense from its constant wear and tear saved; the irregularity of twist from variation in tension, produced by different temperatures and other causes on these bands, is avoided; and as in this improved mule the drawing rollers are directly geared with the tin cylinders, an uniform twist may be relied on, and the yarn can be limited to the minimum requisite amount of twist, and an equal production secured with slower speed of spindle, and consequently a saving of power; or by driving a spindle at the usual speed a proportionably increased production of yarn of superior quality, from its uniformity of twist, is obtained. The backing-off (*i.e.* the

stopping and reversing of the spindles) is effected through a simple friction pulley on the tin cylinder shaft, instead of being conveyed through the rim band, and is consequently more rapidly and accurately performed. The rack pinion for moving the carriage outwards is driven from the gearing to the roller, and a positive proportionate speed obtained. The quadrant for regulating the winding-on is geared with the carriage motion, and the bands dispensed with. The cam shaft is driven by a positive motion, securing accuracy in all the changes of the mule. Great simplicity of construction is secured by having all the motions in the immediate vicinity of where they are required.

COTTON COMBING MACHINE of six heads and drawing head on Heilman's principle, with Hetherington's improvements.

Prices may be had on application to the Works.

[1516]

IRVIN & SELLERS, *Preston*.—Box-wood logs, cuttings, shuttles, bobbins, pickers.

The following specimens of Boxwood, &c. raw and manufactured, are exhibited :—

Boxwood in log; box-wood in cuttings, for engravers' blocks; rules, shuttle-blocks, joiners' tools and handles; bosses for flax-spinners; shuttles of boxwood and fruit-tree; bobbins and skewers of various kinds, used in

the spinning and manufacture of cotton, wool, and silk.

Samples and price lists may be obtained by application stating the nature of the goods required. Foreign orders can be supplied on short notice with the best goods at moderate prices.

[1517]

JACKSON & GRAHAM, *Oxford Street, London*.—Jacquard carpet loom worked by steam power.

[1518]

JAMES, HENRY, *Portland Place, Coalpit Lane, Nottingham*.—Braid and whip machines of all descriptions. (See page 12.)

[1519]

KERR, JOHN, & CO., *Douglas Foundry, Dundee*.—5-roller calendar for finishing cloth, with equalizing screws attached.

MANUFACTURERS OF THE FOLLOWING MACHINES :—

Preparing machines for spinning flax, hemp, and jute; power looms for linen, canvas, and jute fabrics; Cox's patent weft winding machines, and all preparing machines for weaving.

Washing mills for yarn and cloth, rollers for immersing yarn in chemicals, squeezers, pans for boiling yarn or

cloth by steam, yarn softening machines, bluing machines, and all machines for bleaching cloth and yarn.

Calenders, beetles, cropping machines, measuring machines, rolling machines, drying machines, damping machines, mangles, hydraulic presses and pumps, and all machines for finishing and packing linen cloth,

Grinding mills, saw mills, and gas works; water wheels, turbines, pumps; and all kinds of millwright work.

[1520]

LAWSON, SAMUEL, & SONS, *Hope Foundry, Leeds*.—Flax machinery and self acting tools.

[1521]

MACLEA & MARCH, *Leeds*.—System of spiral gill cone preparings for short hosiery wool.

MACLEA & MARCH are manufacturers of HEMP, FLAX, Tow, WORSTED, and SILK WASTE MACHINERY, &c. They exhibit in this class a system of IMPROVED SPIRAL GILL CONE preparings for short hosiery wool, viz. :—

1—8. Spindle cone drawing.

1—16. Spindle cone finisher.

1—54. Spindle cone roving.

[1522]

MASON, JOHN, *Rochdale*.—Patent machinery for preparing and spinning cotton; also woollen machinery on improved principles. (See page 13.)

[1523]

MORRISON, T. & G., *Paisley*.—Jacquard machine.

[1524]

NIGHTINGALE, W. & C., *Old Street, London, E.C.*—Patent horsehair-curling machine.

[1525]

OLDHAM, JOHN C., *Heywood, near Manchester*.—Variety of power loom shuttles.

[1526]

PARKER & SONS, CHARLES, *Dundee*.—Power looms and preparing machines for weaving flax, hemp, and jute.

[1527]

PERRY, JOHN, *Shipley, Field Mills, near Bradford*.—Machinery for preparing and combing wool; circular combs, gills, and fallers.

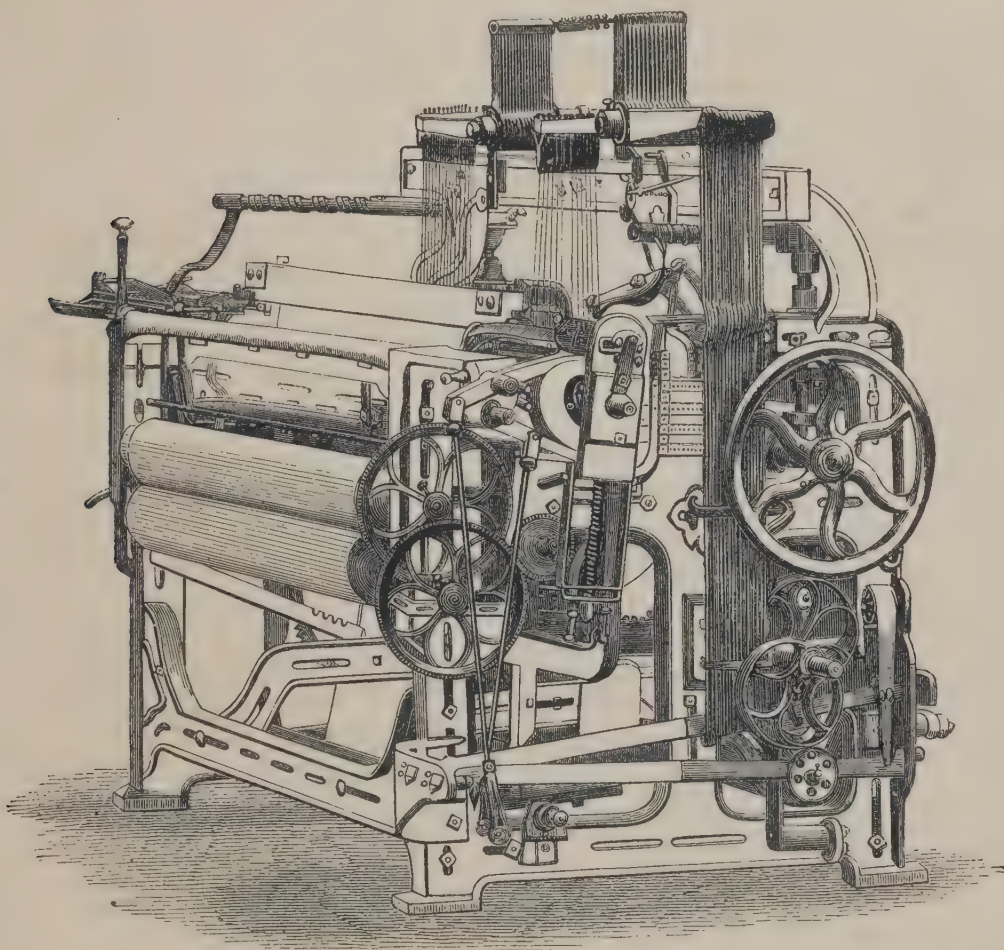
[1528]

PLATT, BROTHERS, & CO., *Hartford Iron Works, Oldham*.—Machinery for preparing and spinning cotton and wool. (See pages 14 to 31.)

[1529]

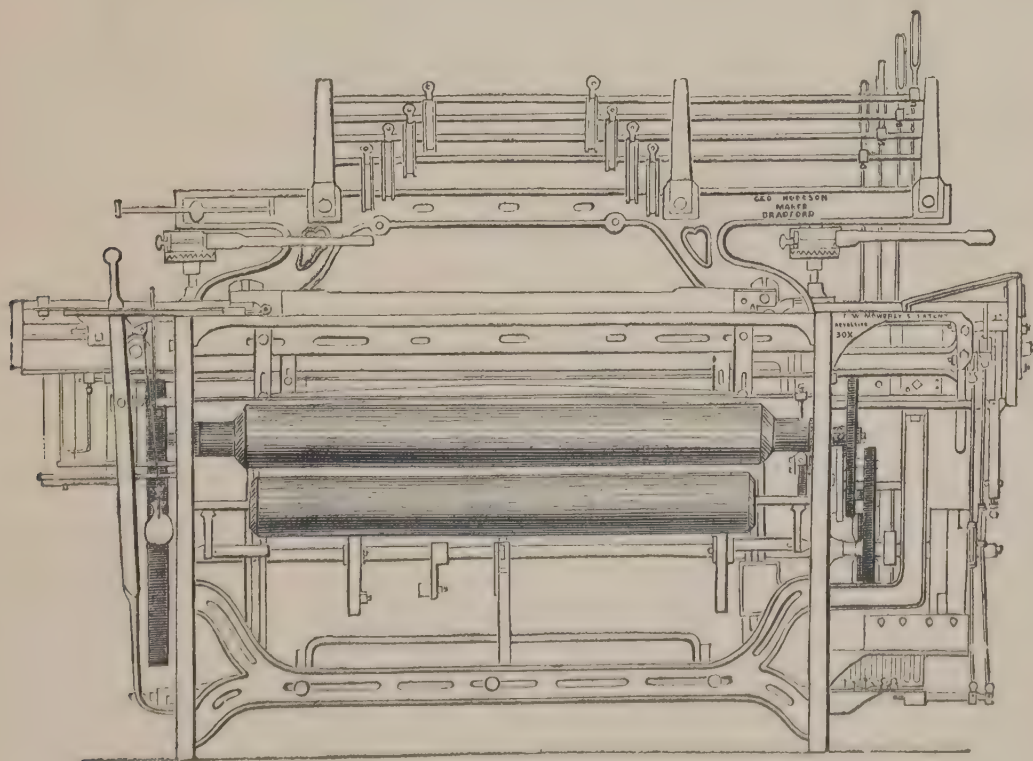
REYNOLDS, BROTHERS, *Belfast*.—Hackling machines.

HODGSON, GEORGE, *Bradford.*—Looms, with improvements up to the present time.



POWER LOOM.

The Exhibitor manufactures every description of power looms, with orleans, cobourg, shalloon, satin, serge, lena, jacquard, serge-de-berry, and every other kind of gearing, for weaving with plain, drop, rising,



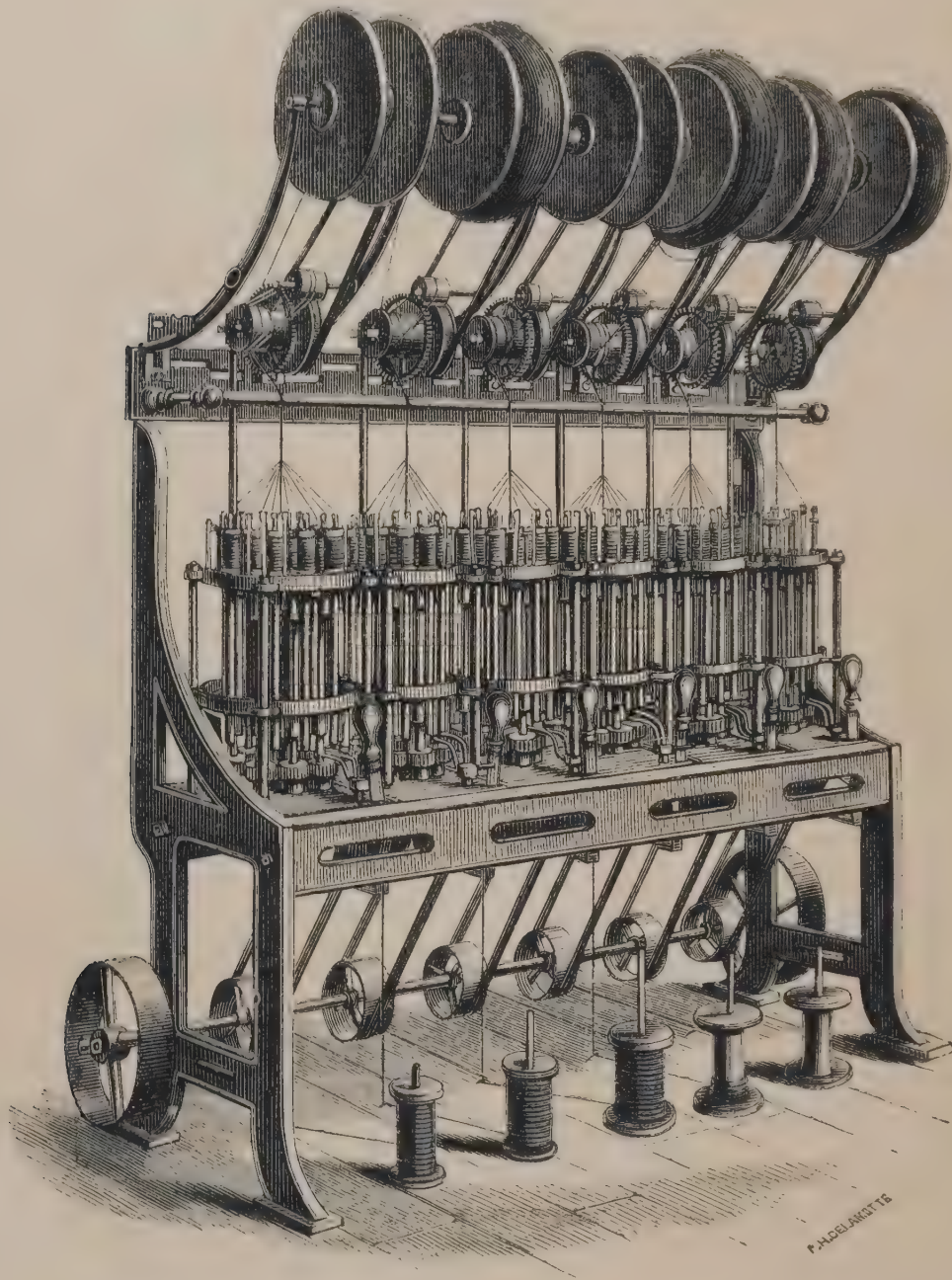
POWER LOOM.

sliding, or revolving circular boxes, for making cotton, worsted, alpaca, mohair, fancy or woollen cloths.

He is also the maker of a patent motion which works in connexion with the boxes, to weave plain, diamond twill square, or satin, and change at pleasure from one to

the other without stopping the loom. This motion is particularly well adapted for weaving the German twill plaids, and has the advantage of a Jacquard machine up to 12 or 20 healds. It is simply worked by two plain tappets, whereby greater speed and better cloth are required.

JAMES, HENRY, *Portland Place, Coalpit Lane, Nottingham.*—Braid and whip machines of all descriptions.



BRAID AND WHIP MACHINE.

BRAIDING MACHINES for covering elastic web, braids, crinoline steel, boot-laces, &c. which perform all these varieties of work without requiring alteration, in one-third less time, and with half the loss by wear of any

other machines of the kind. The exhibitor also manufactures a new machine for braiding whips, which is capable of braiding a six-foot whip in five minutes.

[1530]

ROBINSON, J. & R., & Co., 30 *Milk Street, Cheapside, London.*—A Spitalfields silk-velvet loom at work.

[1531]

ROWAN, JOHN, & SONS, 152 *York Street, Belfast.*—Machine for scutching flax, and other fibrous substances.

MASON, JOHN, *Rochdale*.—Patent machinery for preparing and spinning cotton; also woollen machinery on improved principles.

MASON'S PATENT SLUBBING AND ROVING FRAMES.

The object of these improvements is, to secure larger production, greater durability, and at less cost.

This is accomplished, first, by continuing the collar (which is firmly fixed to the lifting rail) through the pinion wheel, up the inside of the bobbin, nearly to the top, where the bearing for the spindle is formed as shown at *a* in figs. 1 and 2.

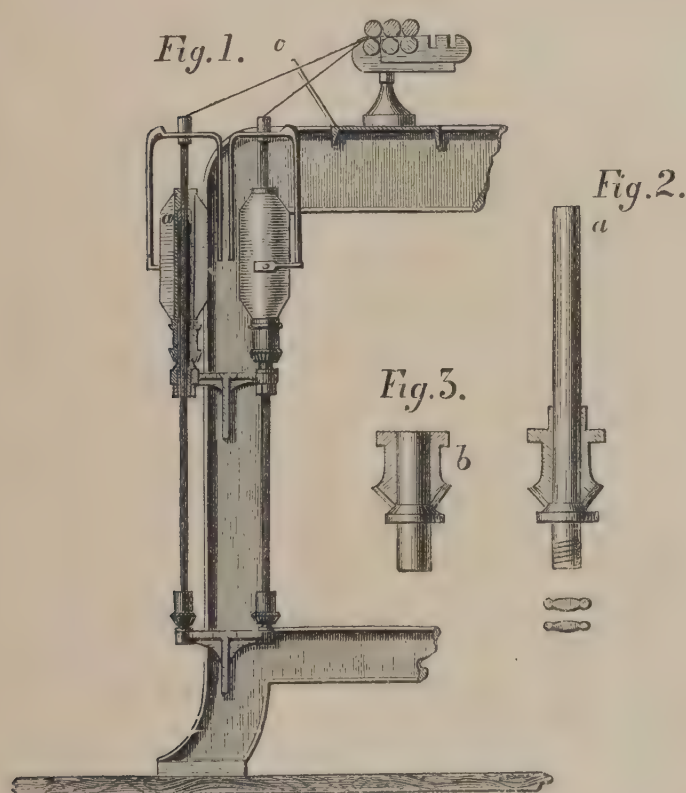
In order to reduce the friction, the collar is made with a recess or hollow chamber inside, so that the spindle only fits at each end. The bobbin at its upper end runs on the spindle as usual, and friction upon the outside of the collar is prevented by its being made to pass at its lower end upon a flange, which projects upon the top of the

pinion wheel. The bobbin entirely covers the collar, protects the bearing from injury by dust or other matter, and thus less oil is required.

The top of the flyer is left clear for piecing-up and doffing.

These advantages are much more manifest after the machines have been some time at work, when instead of having to reduce the speed, it is generally increased a little.

Although the bobbin barrel is about $\frac{3}{16}$ in. larger in diameter, it is not found to be a disadvantage; the frame starts better upon the empty bobbin, and a trifling addition to the diameter, when full, will hold the same length of slubbing or roving.



SECTION AND ELEVATION OF PATENT COLLAR, &c.
IN ROVING MACHINE.

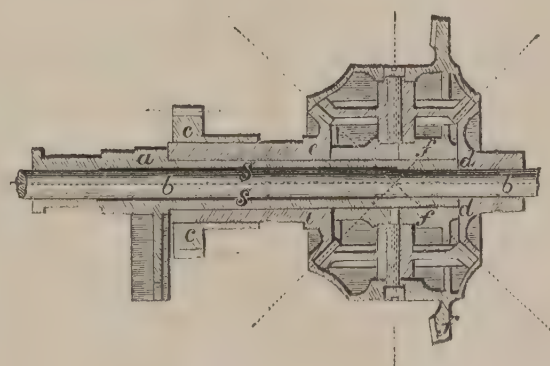


Fig. 4.
DIFFERENTIAL OR JACK MOTION.

The difference between this mode and the best arrangements of collar previously used, is shown at figs. 2 and 3, the bearing for the spindle in the one being at *a*, and in the other at *b*, a difference equal to the length of the lift (say 10 or 12 in. slubbing and 6 or 7 in. roving frames) in favour of this patent. From the increased steadiness of the spindles, there is less wear and tear by friction.

The second improvement is in the separating plates (as shown at *c* in fig. 1) which prevent the ends from becoming entangled, and thus reduce the waste. They are placed between the rollers and the spindles, with convenience for removing at pleasure, to facilitate doffing and cleaning.

The third improvement is in the application of a long boss to the differential or jack motion, as shown at *a a* in fig. 4. The main shaft of the said motion is at *b*, supported by the boss *a*, which according to the usual arrangement terminates at the pinion *c*; according to this improvement, however, it is extended to the point *d*, and the wheels *c*, *e*, *f* are mounted thereon instead of upon the shaft as is usual. To reduce the friction upon

the driving shaft, the long boss is recessed or chambered out, as shown at *g*.

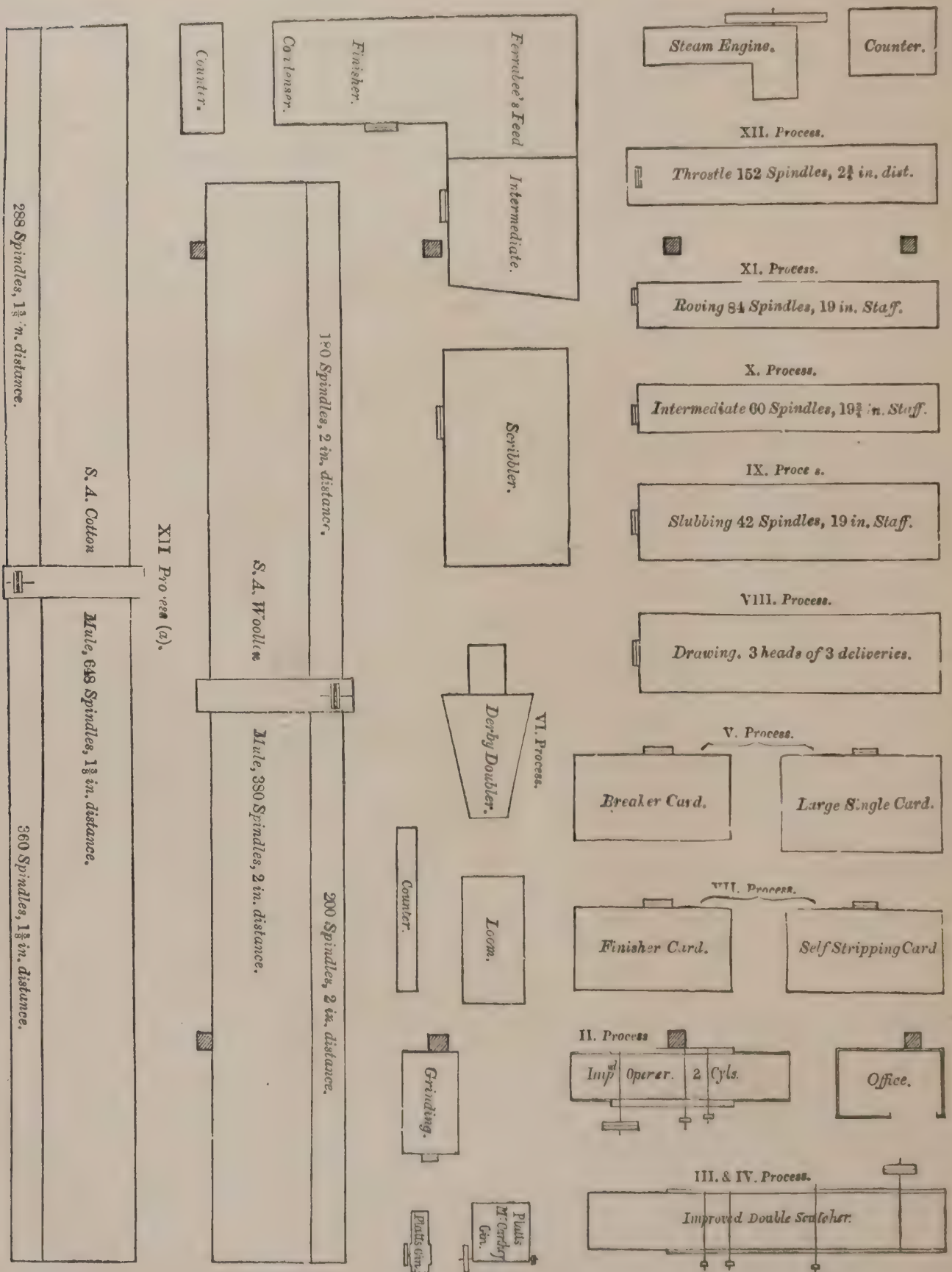
The advantages of the above arrangement are, steadiness in working, reduced friction, and greater durability. This is attained by the increased length and diameter of the bearings, which are of cast-iron. The motions of the box and shaft being opposed to each other, by the introduction of the long boss, the rubbing surfaces are separated, as will be seen from the annexed sketch.

The arrangement as regards the other parts of the apparatus is that in ordinary use.

The following machines are manufactured by John Mason, at the Globe Works, Rochdale:—

Openers, scutchers, lap machines, fans, single and double carding engines, grinding machines with cement and emery cylinders and rollers, drawing frames, &c.; Mason & Co.'s patent slubbing and roving frames; throstles with band and list wharves, winding machines, reels, &c.; teasers; woollen, worsted, and silk carding engines; self-acting cotton and woollen mules and power looms; patent condensor or endless carding engine.

PLATT, BROTHERS, & CO., *Hartford Iron Works, Oldham.*—Machinery for preparing and spinning cotton and wool.



PLAN OF MACHINERY EXHIBITED.

PLATT, BROTHERS, & Co., *continued.*

THE CHURKA GIN.

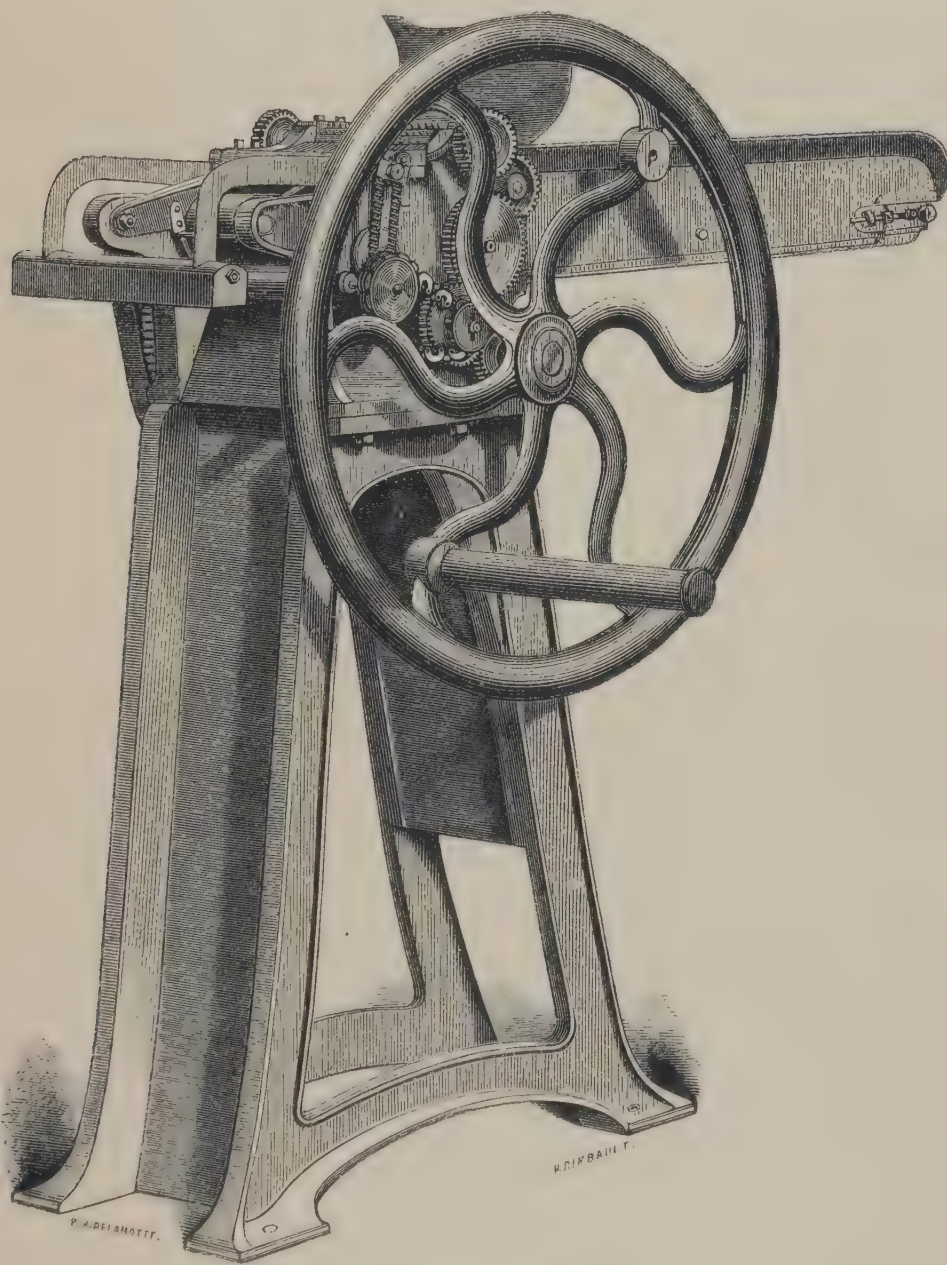
This machine is composed of two rollers, the lower of which is covered with hard wood, and is $1\frac{1}{2}$ in. diameter in its working part; the upper one is of steel, $\frac{1}{2}$ in. diameter, with a finely fluted surface. They work in contact, and are coupled by gearing, so that their two circumferences travel at the same rate. It will clean all kinds of staple from hard seeds, one of its rollers being so small that the smallest seed cannot be taken in by the rollers.

When the fibre is separated from the seeds it is passed through the rollers and delivered, whilst the seeds as they are released drop through the grid in front of the rollers.

PLATT & RICHARDSON'S PATENT CHURKA GIN (exhibited)

The novelties and improvements introduced, consist in holding the rollers in contact, supplying them with seed cotton by a self feeder, and in preventing them from lapping. They operate as follows—The cotton containing the seed is spread on an endless travelling lattice, which conveys it to a series of three spiked rollers, the first of which revolving over the lattice and its circumference travelling at the same speed, holds the cotton; the second which travels much faster fills the spikes with cotton; whilst the third moves at an intermediate speed to the other two, its object being to prevent the second roller from carrying pieces of cotton on its surface.

The next operation is to strip the second roller and



COTTON GIN—HAND.

convey the cotton to the Churka rollers. This is done by a comb having a circular vibratory motion, given to it through an elastic connecting rod to prevent breakage in case of obstruction. After this operation of the rollers and comb, the fibres are loosened from the seeds, and are in the most favourable condition for being passed through the wood and steel Churka rollers. The steel roller is held in contact with the wooden roller by a weight and levers bearing upon its journals. A knife is fixed in a frame over the top of the steel roller to keep

it clear. This frame also carries a roller covered with leather, which runs in contact with the wooden roller: this knife and the roller prevent the steel roller from being wrapped with cotton, and can be lifted out of the way together.

The bottom or wooden roller is kept from wrapping by a fluted roller revolving under it on the delivering side, and driven by one of the other rollers.

This gin will separate from hard seed about 600 lbs. of clean cotton weekly.

PLATT, BROTHERS, & Co., *continued.*

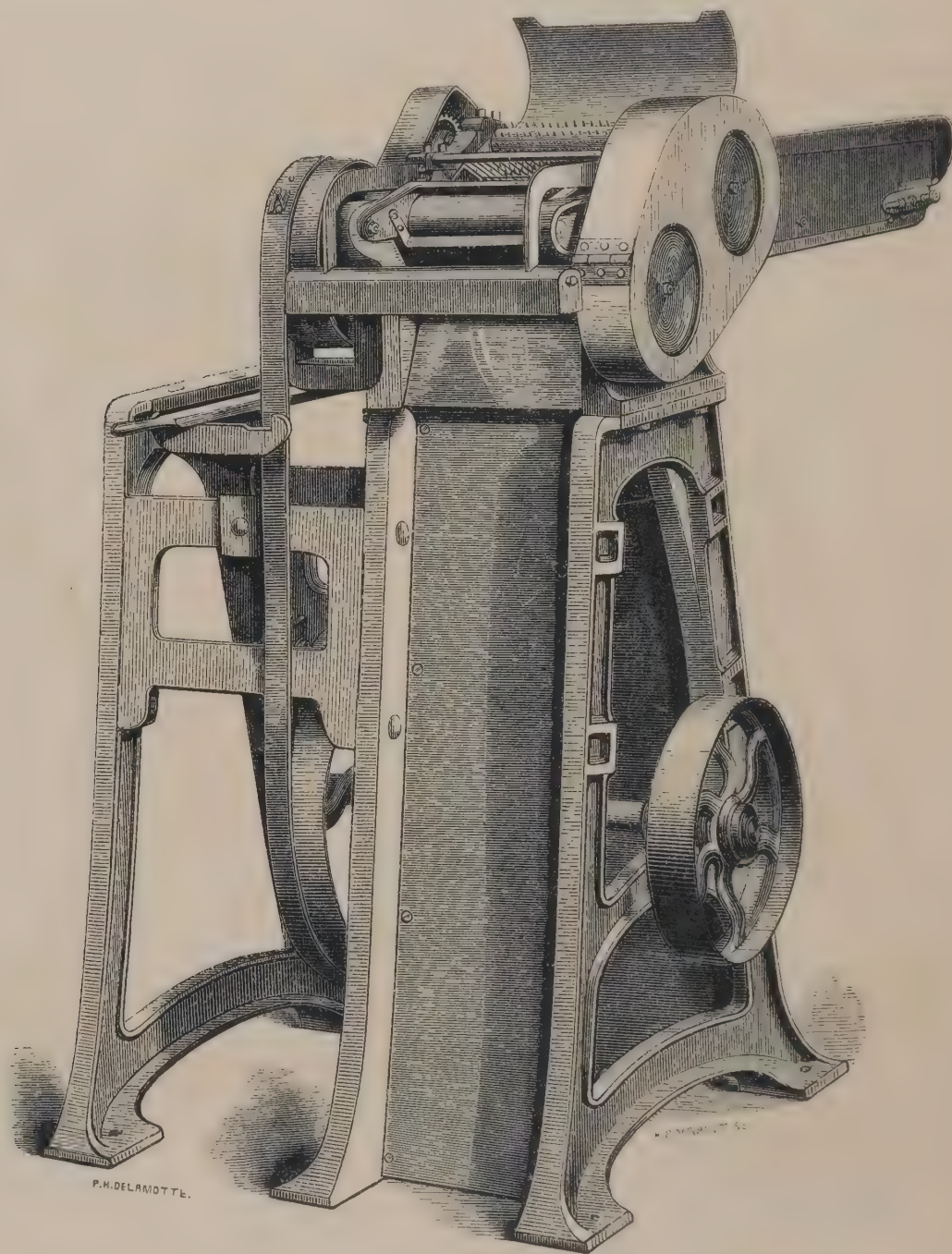
THE MACARTHY GIN.

This is a machine for separating cotton fibre from its seed.

The original Macarthy gin consists of a roller covered with leather about 5 in. diameter, having a number of small grooves cut in spirals in its surface, making about one hundred and ten revolutions per minute. On the face of this roller is a thin steel plate acting against it with a slight pressure; it is also furnished with a wire grid, upon which the seed with its fibre attached is pushed by hand against the face of the roller, which, by means of the

spiral grooves, and the adhesive nature of the leather surface, draws the fibre under the steel plate until the seeds come in contact with its edge. Whilst the fibres are thus held the seeds are pushed off by the edge of a bar which has a vertical vibratory motion, so as to pass the edge of the plate where the seed is held, and thus separate it from the fibre, which is carried forward and delivered by a fluted roller placed in front, and which revolves in the same direction as the Macarthy roller.

It is important to make the spaces of the grid to the size of the seed the machine is cleaning, for



COTTON GIN—STEAM POWER.

if too coarse the seeds will pass through before they are cleaned, and if too fine they will accumulate.

ONE DOUBLE-ACTING MACARTHY GIN.

Platt & Richardson's patent (exhibited).

The novelties and improvements introduced are, in feeding the machine with seed cotton, which is placed on an endless travelling lattice, and conveyed by it to a series of rollers, the last of which is furnished with spikes, and travels at an increased speed, so as to separate

the tufts in detail from the sheet spread on the lattice. From this spiked roller, the tufts are transmitted to the Macarthy roller by a comb having a circular vibratory motion given to it, through an elastic connecting rod, by which breakage from obstruction is prevented; also in the introduction of two bars with vertical vibratory motion, moving alternately from a double crank (Platt & Richardson's patent balance), for the purpose of pushing the seeds from the fibre whilst held by the steel plate.

These improvements cause an immense saving of labour, as hitherto each machine required an attendant,

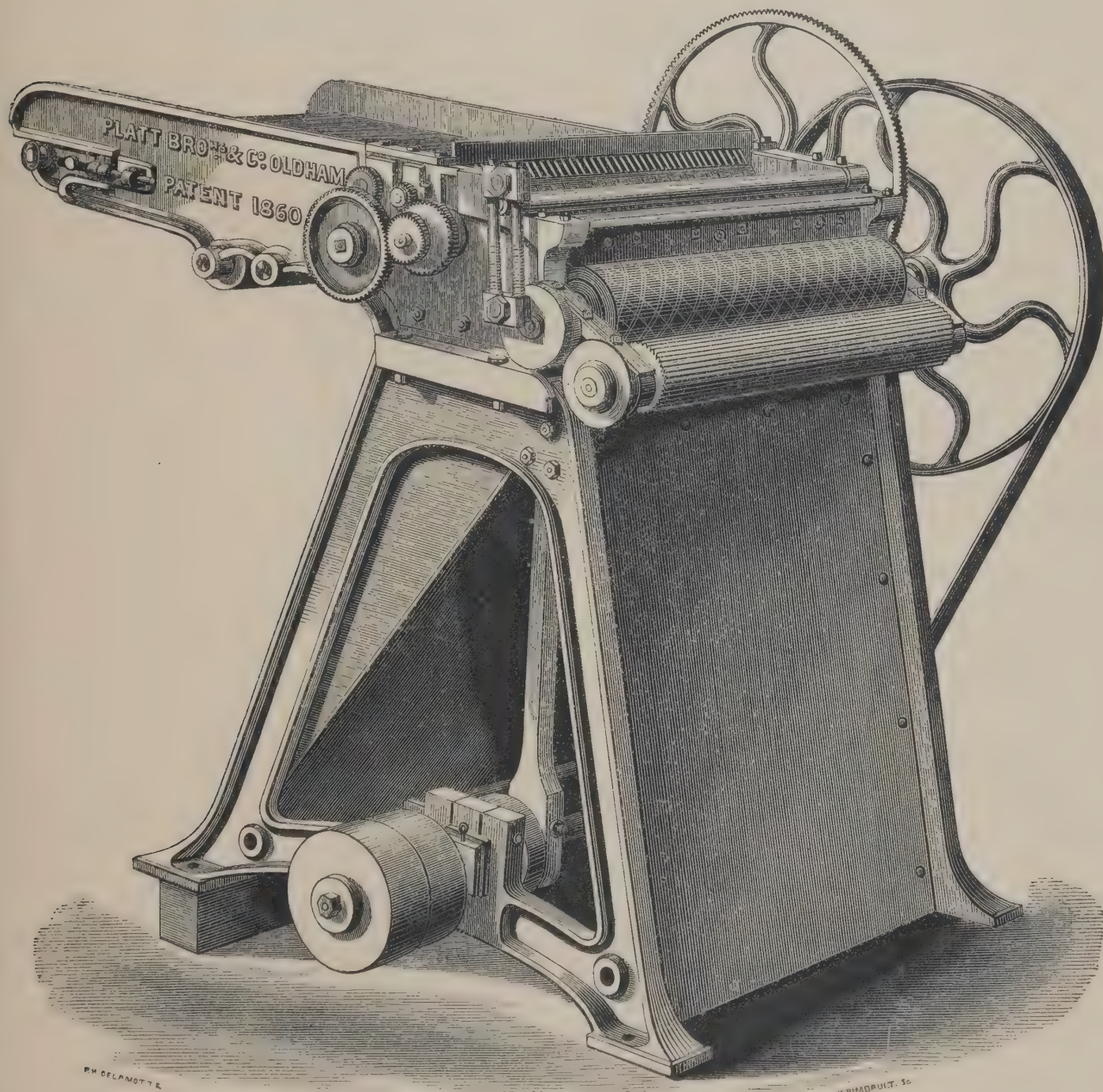
PLATT, BROTHERS, & Co., *continued.*

and now one attendant can superintend several machines, whilst each machine will clean more than double the quantity.

This machine will clean all kinds of cotton, but it is especially adapted to such as contain soft and woolly seeds.

A machine 24 in. wide will separate from hard seed about 1000 lbs. of clean cotton weekly.

MIXING (FIRST PROCESS).—Selecting the bales and mixing the cotton is the first process in the cotton manufacture. It is done as follows—A selection of bales of cotton suitable to the class of yarn required is made, and their contents spread out in layers of each so as to form a stack called a “mixing,” from the sides of which the cotton is taken vertically to supply the opener.



MACARTHY GIN. (PLATT AND RICHARDSON'S PATENT.)

THE COTTON OPENING (SECOND PROCESS). — This process is to open out the fibres of the cotton after it has been pressed in bales, and to extract the sand, dried leaf and other impurities imported with it, and it is important to do this without entangling or injuring the fibre. The machines used for this purpose are of various kinds, to suit the requirements of the trade.

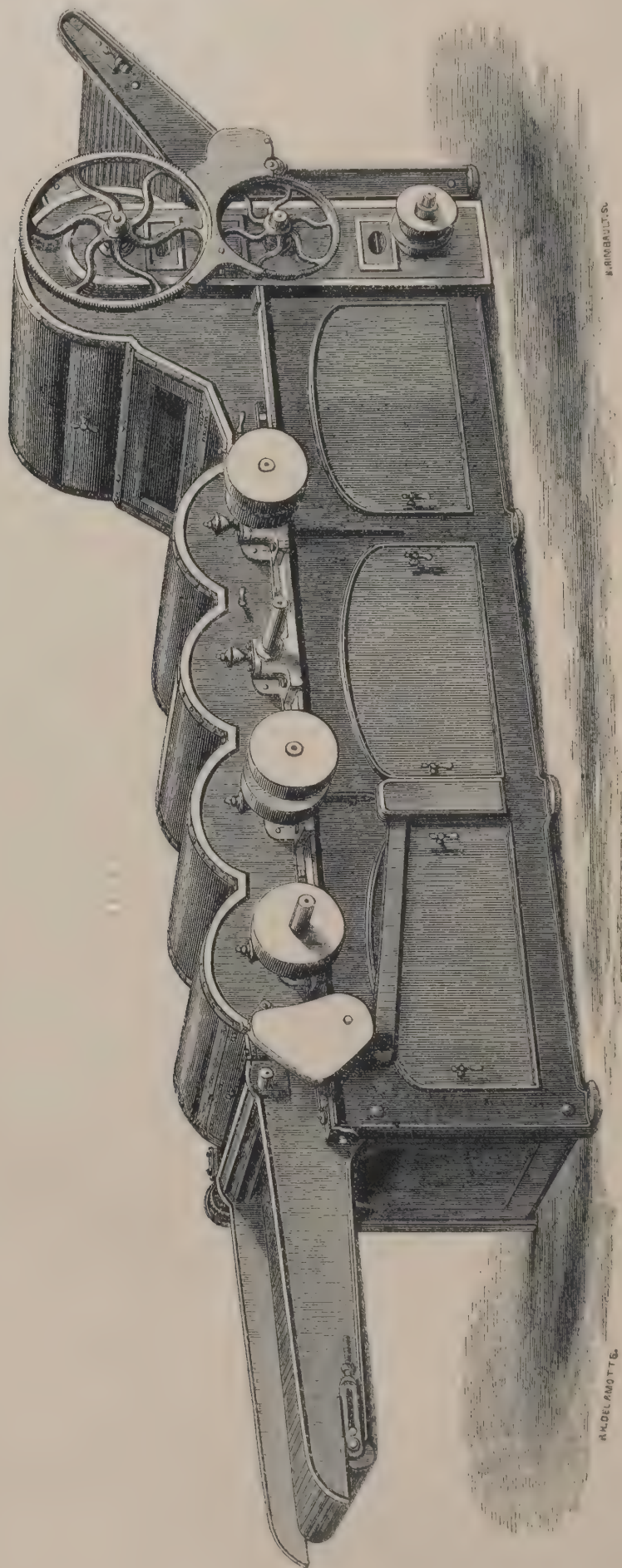
NEW OPENING AND COTTON-CLEANING MACHINE.

The machine illustrated is recommended and used for cottons of short and middling staple. It comprises an endless lattice, upon which cotton is spread, and an iron

roller with ribs on its surface, which together convey the cotton to a pair of fluted feed rollers, and is delivered by them to the first of a series of four cylinders which is furnished with twelve rows of teeth, the second, third, and fourth having only four rows of teeth. These cylinders revolve in the same direction, in journals or bearings supported by a horizontal framing, at a speed of about 1,000 revolutions per minute. These cylinders are all cased on the upper side with sheet iron, the first part of the under side of each is cased by angular bars with spaces betwixt them, forming a circular grid, which allows the dirt disengaged by the action of the cylinders to pass through to the floor.

PLATT, BROTHERS, & Co., *continued.*

The remaining part of the under casing is made from a perforated sheet of metal, which allows the dust to escape through whilst the cotton is passing over it.



COTTON OPENER.

The first of these cylinders strikes the cotton from the feed rollers, passes it over the circular grid and perforated plate, and delivers it to the second cylinder, whence it receives a blow equal to the combined velocity of the two cylinders, and passes it on to the third and fourth cylinders, so that this action is repeated three times with the four cylinders, each making a deposit through its respective grid and perforated plate, and as the light fibre only

PLATT, BROTHERS, & Co., *continued.*

offers any resistance to the quick blows of these cylinders, it is impossible it should receive any injury in this operation.

The last or fourth cylinder drives the cotton over a straight grid to the back of two wire cylinders, when it is collected and afterwards stripped by two iron rollers, which carry it to a delivery lattice in front of the machine, so that throughout the whole passage of the cotton from the feed rollers to the wire cylinders, there is a continual deposit of impurities.

The two wire cylinders are exhausted by a fan which collects the dust within the casing of the machine and forces it into any place provided for its reception, by this means keeping the rooms where these machines are in operation perfectly free from dust.

These machines are also constructed with one or two cylinders, and with lap machines attached, so as to prepare laps to be afterwards fed up the scutcher.

ONE OPENING MACHINE, with two cylinders and lap attached (exhibited).

REMARKS.—The machinery previously used for opening and cleaning cotton having been found incapable of taking out the dried leaves and other impurities contained in the cotton imported to this country during the last few years, without materially damaging the cotton fibre, has called for the introduction of this machine to the trade, and it is found to be admirably suited to the purpose.

SCUTCHING AND LAPPING (THIRD PROCESS).—The machines are supplied with cotton from the opener in a uniform fleece by two methods; one by dividing a feeding lattice into a number of equal parts, and spreading uniformly upon each part a given weight of cotton to present to the feed rollers. The other is by driving the lattice and feed rollers of the scutcher at varying speeds in proportion to the thickness of cotton supplied, which speed is regulated by the rise and fall of the top feed roller multiplied by levers, so as to guide a strap communicating motion to the lattice and feed rollers, from a cone pulley revolving at a uniform rate to a second cone pulley. These pulleys are on parallel vertical axes attached to the sides of the feeder; thus when the feed roller rises, its speed is diminished, when it falls it is increased, and an almost uniform supply of cotton is presented to the first cleaning cylinder, which is furnished with twelve rows of teeth, that in revolving strike the cotton and pass it over a circular grid to a revolving beater with three blades, which then passes it over a second circular grid and a straight grid to a pair of wire dust cylinders that are exhausted by a fan. The cotton is then stripped from these dust cylinders by a pair of iron rollers, and passed through a second set of two pairs of feed rollers which revolve more quickly than the first, thereby delivering a thinner fleece to the second beater, which again passes it over a circular and straight grid to two other wire dust cylinders which are stripped by rollers as before. This latter pair of cylinders and rollers travel at three times the speed of the feeder, so that they deliver a fleece one-third the thickness first supplied to the machine.

The next operation is to form the cotton into a large roll or lap. This is done by the lap machine attached to the scutcher, forming together one machine.

The rollers which strip the last dust cylinder, deliver the fleece to a set of four callender rollers placed over each other, so that the cotton in passing through them receives three compressions, which form the fleece into a kind of felt; three of these callenders have their surfaces kept clean by bars of iron covered with flannel which are pressed in contact with them. The cotton then passes over one of two large fluted rollers which revolves in the same direction, and under a smaller plain roller which is above the fluted roller, and receives its motion from it by contact through the fleece; this small roller also cleans the second callender roller, by running against it in a contrary direction with a slight pressure (it also breaks the fleece when the lap is formed).

The fleece is now wound upon an iron tube slightly taper, that is placed in the channel between the two fluted rollers, and driven by contact with them, having gudgeons at each end, on which it receives pressure from two friction pulleys revolving in racks placed vertically and gearing into pinions upon a shaft across the machine. This shaft again communicates by gearing to a break pulley which has a slight pressure given to it by a lever that can be released by the foot of the attendant; by this means as each successive layer is wound upon the rollers, the break slips and allows it to rise. One of these fluted rollers has a worm on its axis geared into a wheel with such a number of teeth, that one revolution of it will indicate the length of fleece to form the lap required. On the same axis as this wheel is a tappet which stops the feeding motion and callenders, by pulling the support from under the hand levers that carry the end of the driving shaft. When the wheel drops out of gear, the two fluted rollers carrying the lap continue to revolve and break the fleece, the foot lever releases the break, the racks are lifted by a hand wheel, and the lap is taken out and stripped by dropping the small end of the tube upon a block of caoutchouc placed conveniently on the floor, and which, by its elasticity, causes the tube to rebound from the lap, when the attendant seizes it, lifts it out of the lap and again places it upon the machine, lowers the rack and friction pulleys by the hand wheel, lifts up the gear levers, and the process again commences.

THE SECOND SCUTCHING AND LAPPING (FOURTH PROCESS).—The machine used in this process is similar to the one previously described except in its feeder part, which is so arranged that three of the laps made by the first machine can be placed upon it so as to be uncoiled by the traverse of the lattice, and which is done as follows.—Through the centre of the laps rods are inserted, the laps are then placed upon the lattice with the rods in slits or guides made in the framing to receive them, and thus keep them parallel; the laps are then uncoiled and spread upon the surface of the lattice in three layers on the top of each other, so as to present to the feed rollers a uniform fleece equal in thickness to that fed upon the first scutcher.

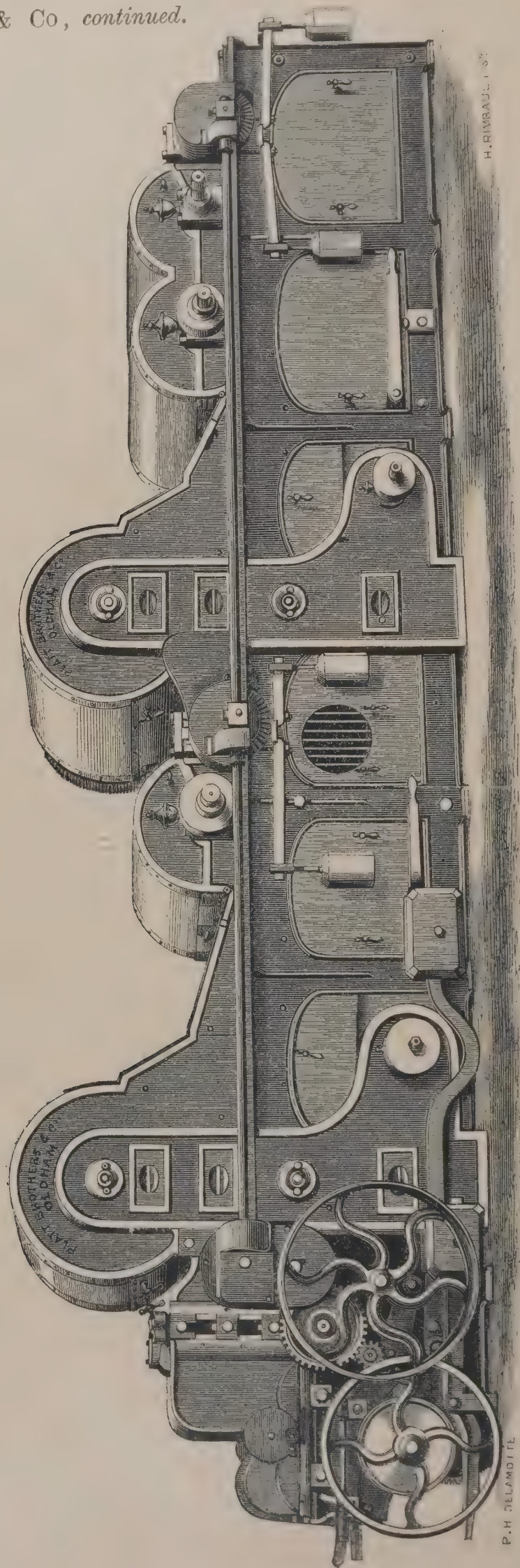
The machine is then set in motion, the cotton is passed through the feed rollers, and the remainder of the operation is precisely the same as in the machine previously described. By thus doubling the laps the fibres are more thoroughly mixed, and the fleece is made more uniform in thickness; and as the fleece must be uniform in its length and breadth as well, it is absolutely necessary that the beater should produce one uniform current of air, and thus waft the fibre over the straight grid direct to the wire cylinder. It is whilst the cotton is thus floating that the heavier impurities, loosened by the beaters, drop out and fall through the grids into the dust boxes. The laps formed by this machine are then taken to the breaker carding engines.

ONE NEW SCUTCHING AND LAPPING MACHINE (exhibited).

Novelties consist of an improved section of machine, by which more uniform currents are obtained, and better felted laps produced; in cylinders with teeth in combination with a beater with knives instead of having a beater only; in producing a uniform fleece by varying the speed of the feed roller; and lastly, in the covering and casing them with steel made by the Bessemer process, and in the application of Lord's patent feeder.

REMARKS.—By successive stages through a long series of years to the present time, the difficulties which originally presented themselves to the adoption of this class of machinery for cotton cleaning have been overcome, and the cotton can now be perfectly cleaned without injury to the staple or fibre, laps produced with fleeces uniform in length, breadth, and thickness, and so felted that they uncoil at the carding engine without any derangement of the felted fleece.

PLATT, BROTHERS, & Co, *continued.*

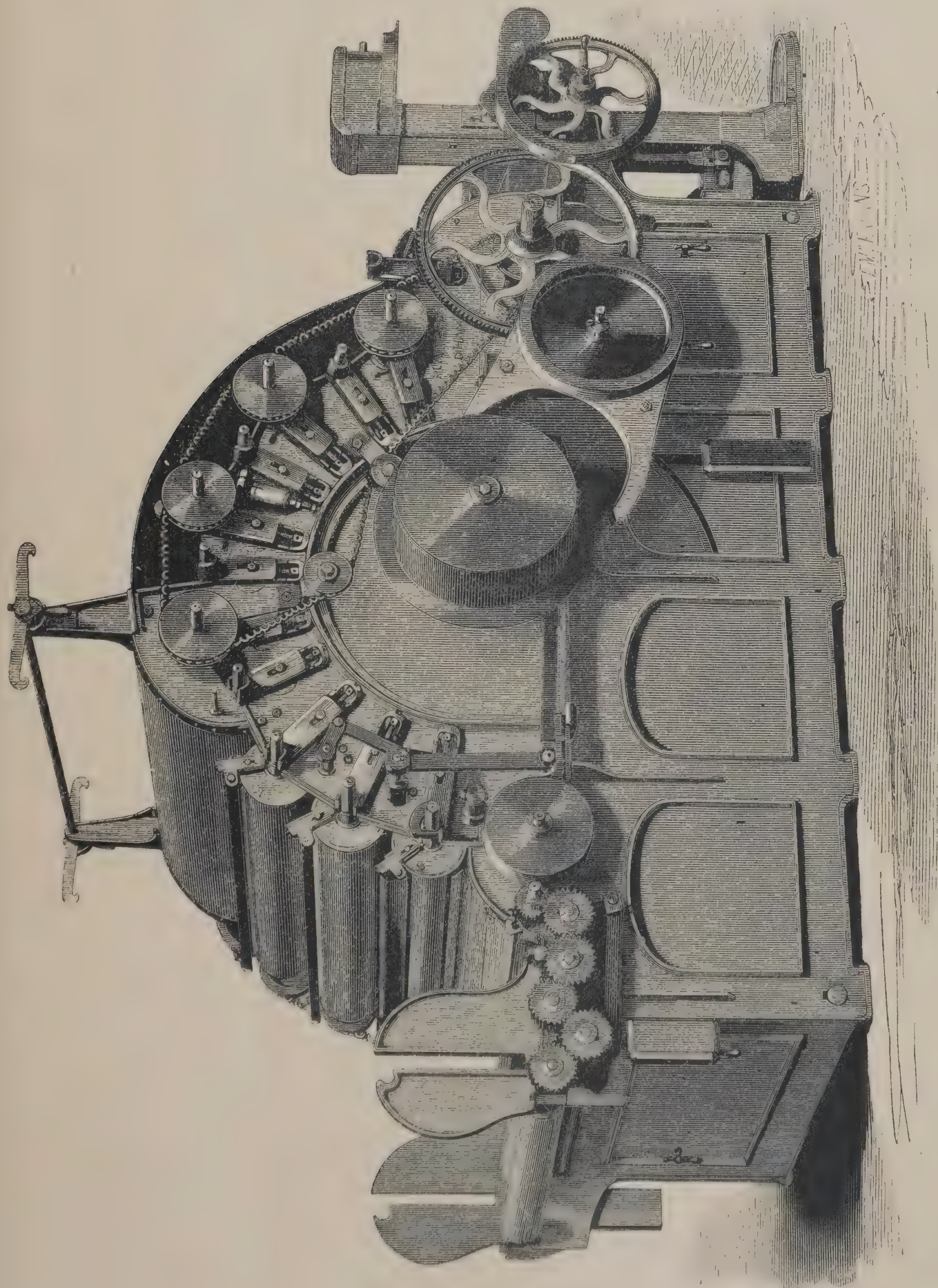


DOUBLE SCUTCHER.

PLATT, BROTHERS, & Co., *continued.*

THE FIRST CARDING ENGINE (FIFTH PROCESS) continues the operation from the lap machine to the drawing frame by a kind of combing process. For low

coarse yarns one only is used (single carding) to change the lap fleece into a sliver, but for finer yarns, and for coarse yarns made from the best description of cotton,



BREAKER CARDING ENGINE.

two cards are used, one acting as a "breaker" and the other as a "finisher," the laps to supply the latter being formed from slivers delivered by the breaker on a machine called

the Lap Doubler. By this process the felted fleece delivered by the lap machine, with its fibres crossed in all directions, is combed and straightened, and the light

PLATT, BROTHERS, & Co., *continued.*

impurities still adhering to it, such as short fibre and the moss-like covering of the seeds, are taken out, for if allowed to pass this operation they would give a roughness to the yarn. To straighten and clean each fibre in the fleece, it requires to be combed many times, and this is done in its passage through these machines as follows—The breaker card illustrated (may also be used for single carding for coarse yarns) has a taker-in, three self-stripping dirt rollers (Adshead's patent), and the remainder of its upper surface covered with rollers and clearers. This card is supplied or fed by a lap of the fleece from the lap machine, which is placed on a roller at its feeding end, guided by plates at each side which have slots in them to receive the ends of the rods passing through the laps' centre. The unlapping of this fleece is governed by the motion of this roller; it is now passed over the plate to the feed roller which delivers it to the taker-in roller; at this point the combing or carding commences, whilst the fleece is held by the feed rollers travelling at a slow speed, the taker-in running much faster and having its surface covered with cards (see CARDS), a kind of wire brush covered with crooked teeth so fixed that the points of the teeth strike down into the fleece held by the feed rollers. As these fibres are combed the impurities separated fall to the floor; the taker-in passes the fibrous tufts of cotton as they are released by the feed roller on its under surface to the large cylinder which is also covered with cards and which revolves in an opposite direction to the taker-in. The points of its teeth incline in the direction of motion, and its surface travels much faster than that of the taker-in from which in passing it takes the fibrous tufts and carries them to the self-stripping dirt rollers, the cards on which have their hook point to face those of the cylinder, so as to hold in the interstices of their wires such impurities as they may receive, which are carried forward by their motion and stripped by a vibratory comb so as to form a roll on their upper surfaces, to be taken away at intervals.

These dirt rollers revolve with a very slow motion, so that they assist in stretching the fibres as well as in collecting the dirt. From the dirt rollers it passes under the first clearer to the first carding roller, whose hooks also face those of the cylinder, so as to straighten the fibres and divide any tuft remaining; this roller passes the fibres fixed in its teeth (by their antagonism with the cylinder) back to be stripped by the clearer, this again delivers them to the cylinder to be again divided by the same roller. This operation is repeated by each of the five rollers and clearers, till the tufts are all reduced to straight fibres, which pass on to the doffer (another cylinder about half the size of the main cylinder); the hooks of the doffer face the cylinder, its motion also recedes with it and travels at a much slower speed, the fibres are again stretched whilst they are left on its surface, they now pass on its under side to be stripped by the doffing comb, which is formed of thin plates of steel having fine straight teeth on their lower edge, which are hardened to prevent wearing; these plates are fixed to a channel-bar which is connected at each end to a crank running at a high speed, and which gives to it a vertical vibratory motion, so as to strip a portion of fleece from the face of the doffer by its downward motion and clear itself by its rising, the fleece is then contracted through a funnel and taken forward by the drawing rollers which deliver it in the form of a sliver or riband to the coiler and can.

COILER AND REVOLVING CAN MOTION.

This is a small machine for receiving the slivers from the breaker cards, and coiling it into a tin can for the purpose of taking it to the lap doubler. It works as follows—The sliver from the draw-box of the carding engine is passed through a funnel in the top cover of the machine, to a small pair of revolving rollers underneath, by which it is taken in and delivered through a tube and revolving plate to the can over which it is

placed: the top end of the tube is concentric and the lower end eccentric to its motion, *i.e.* the tube is placed at an angle. The can is situated below in a revolving dish, whose position is eccentric to that of the top plate; by means of these two motions, and the top plate running a number of revolutions for the bottom plate one, the can receives a number of coils each revolution. The outside of these coils are laid so as to touch the inside of the cans, where they form circles of coils continually crossing each other, until the can is full up to the top plate, which, still continuing to deliver, presses more sliver in the can, and thus causes them to come out without adhering to each other.

A BREAKER CARDING ENGINE 40 in. on wire, 40½ in. diameter of cylinder, patent feeder, taker-in 9 in. diameter, three self-stripping rollers, four rollers and four clearers, 20-in. doffer, coiler and revolving can motions, and Platt & Richardson's patent balanced cranks (exhibited).

A BREAKER CARDING ENGINE 40 in. on wire, cylinder 40½ in. diameter, patent feeder, taker-in 9 in. diameter, two self-stripping rollers (Adshead's patent), five rollers and four clearers, 20-in. doffer, coiler and revolving can motions, and Platt & Richardson's patent balanced cranks (exhibited).

CARDS.

These cards are made by fixing staples about ½ in. long, and ¼ in. wide, made of very fine wires, with a side bend in the middle of their length, into a strip of elastic cloth composed of caoutchouc, united to a number of layers of cloth, made from either linen, cotton, and wool, or a combination of these materials; these strips are about 1½ in. wide, and in lengths that will cover the cylinder by being wound spirally on its surface. These staples or teeth are made of varying strengths of wire, and set in the cloth at pitches to suit the parts of the machine, as well as the kinds of work they are intended for; they were formerly all set in leather, which is still used to a limited extent for cotton, but still more generally for wool. When the card is wound tight on the cylinders the crossed end of the staples is pressed to its surface, so that they can neither rise nor fall, but have an elastic firmness which keeps them to the work.

A portion of the wire used in making the cards exhibited is from steel made by Bessemer's process.

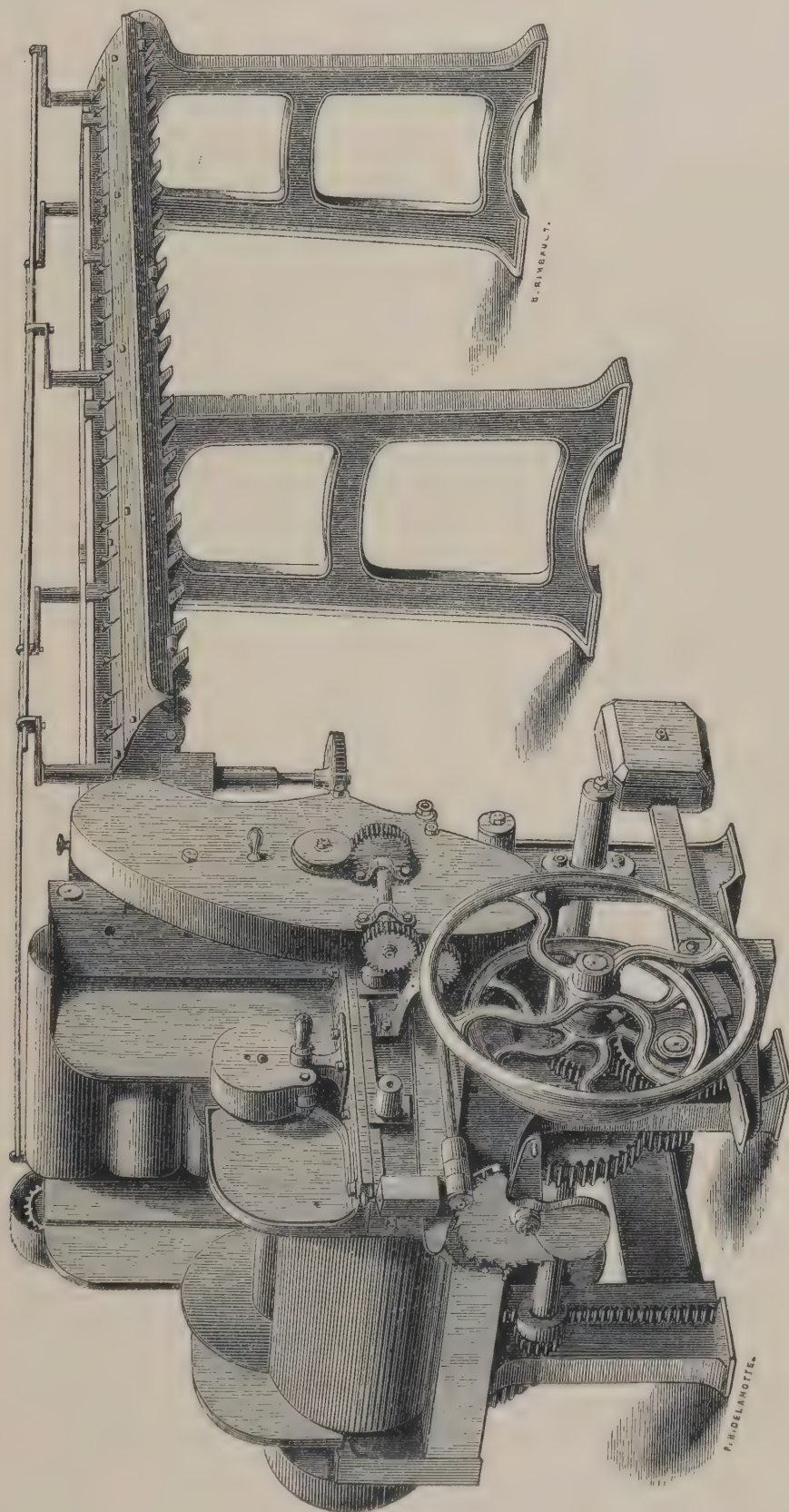
THE LAP DOUBLER (SIXTH PROCESS) exhibited.—By this machine the slivers from the breaker card are formed into a fleece and coiled into a lap to supply the finisher card; it operates as follows—Two rows of tin cans containing slivers are placed on each side of the feeding table, which forms the section of a cone; this table is furnished with two pairs of plain rollers of the entire length of, and parallel to, each side; these rollers take the slivers from the cans filled by the coilers, and deliver them upon the surface of the table. In their course from the cans to the table the slivers pass through holes in a bar of iron to guide them over a curved plate, under which is a revolving shaft that carries a boss with three wings opposite each sliver. On the top edge of the curved plate is a fulcrum, which carries a small two-ended lever; the lower end hangs under it, and is heavier, to give it a vertical direction, so as to cause it to fall in contact with one of the wings in the revolving shaft. The top ends of these levers project above the plate, and are pressed down by the slivers passing over them, when the shaft is free to revolve, till one of the slivers either breaks or runs out, when its lever falls, and stops its motion. The stopping of this shaft puts in motion a cam that moves the strap upon the loose pulley, and stops the machine; the end of the sliver is again supplied, and the machine proceeds as

PLATT, BROTHERS, & Co., *continued.*

before. By this means missing slivers, or “singles,” is entirely prevented, and the fleece is uniform.

Two slivers, one from each side, pass up the centre of the table, close to each other, from the apex of the cone, the others are supplied in equal divisions on each side, so as to fill the whole surface.

The lap machine is connected to the wide end of the table, and the first of its callenders that receives the sliver, travels at the same surface speed as the smaller rollers that supply the table from the cans, so that the slivers move in straight lines from one to the other, and are drawn over the table by mutual assistance, as the



DERBY DOUBLER.

long ones up the centre would break if not assisted by those at the sides.

The machine that winds the lap is similar to that described for the scutcher, but the laps are wound upon wooden bobbins that are taken with them to the cards. These bobbins are weighted by Knowles' patent motion, consisting of an iron roller which presses on them

whilst their ends are formed against revolving washers, guided in their centres, without gudgeons, which facilitates the removal of the laps.

These machines are constructed to form laps, either one-third, one-half, or the full width of the lap required, as may be desired.

The novelties introduced are—improved stop motions

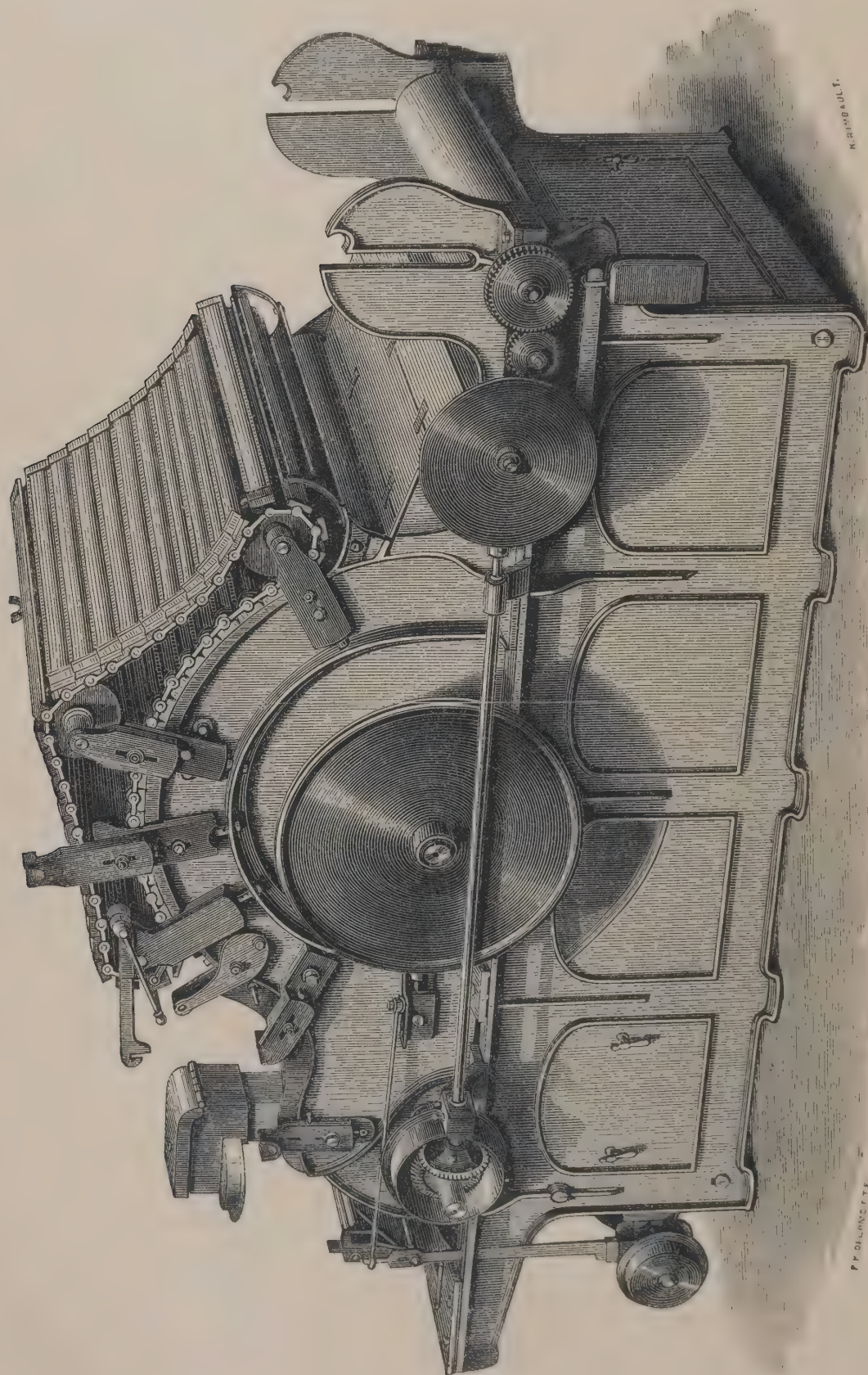
PLATT, BROTHERS, & Co., *continued.*

(Knowles' patent), revolving plates to lap ends, feeding table, and improved general construction of machine.

THE SECOND, OR FINISHER CARD (SEVENTH PROCESS).
—The finisher card continues the operation of combing and cleaning commenced by the breaker.

In some cases for carding middling qualities, cards similar to the breaker cards before described, are used as finishers also ; so that if desirable both may be used for single carding.

For fine qualities those of the construction illustrated and exhibited are most generally used ; for fine qualities



FINISHING CARDING ENGINE.

of still higher counts, this construction of carding engine is used for both breaker and finisher ; and for the finest qualities, it is used as a breaker card for cotton to be afterwards combed by the combing machine.

The finisher is supplied with laps formed by the lap doubler (before described) of 96 slivers from the breaker

card, in order that the mixing of the cotton may be more thoroughly effected, and to ensure more perfect uniformity of the sliver.

These laps are placed between two rollers at the feeding end of the card which unlap the fleece and deliver it to the feeding roller ; they are guided at each

PLATT, BROTHERS, & Co., *continued.*

side by a plate to keep the fleece central with the cards. The taker-in roller combs it from the feed rollers, and carries it to the main cylinder, which is covered on a portion of its surface with a train of iron flats, covered with cards, and united at each end by links, so as to form an endless travelling lattice. This lattice is carried on shafts, having a slow motion, and supported by bearings in the general framing. Those flats in operation slide upon a curve that is adjustable to the cylinder.

The sliding portion of the flat is formed with a slight angle to the face, upon which the card is fixed, so that the point of contact with the cylinder will be near to the front or leading side of the card. Those flats not in operation slide on plain slips on each side of the cylinder to support them whilst the faces of the cards on their surface are ground true and sharp by a short disc of metal covered with emery, and running at a quick speed and at the same time traversing over the lengths of the strips of card on the flats, so as to form the points of wire to a true surface. The hooks of these cards face those of the cylinder, so that each flat combs the fibres as it passes on the face of the cylinder. The main cylinder and doffer are also made true by this method of grinding. The impurities separated are carried forward by the motion of this train, and are stripped off by a vibratory comb in front, when they fall into a box.

After passing the flats, the fleece is again combed and delivered as before described in the breaker carding engine.

TWO FINISHER CARDING ENGINES, 40 in. on wire, cylinder $40\frac{1}{2}$ in. diameter, with patent feeder, taker-in 9 in. diameter, fifty revolving flats (Leigh's patent), eighteen of which are in action, and doffers 18 in. diameter, coilers and revolving can motions, guards to wheels, &c., and Platt & Richardson's patent balanced cranks (exhibited).

The novelties consist in the arrangement of the machine, so that the flats can be accurately ground whilst the card is working, and the other portions of the machine can be stripped and ground without being moved from their place, and in the application of a motion to stop the doffer when breakage of sliver or any other obstruction occurs.

REMARKS.—Until recently, the finisher cards were constructed without taker-in rollers, the main cylinder taking the fleece direct from the feeding roller, causing the fibres to fill the cards, and any impurities passing the feed rollers damaged the cards on this large surface. By using taker-in rollers, these evils are prevented, the fibres being delivered to the cylinder without pressure.

The original difficulties with the carding engine were to maintain true surfaces, on which the cards were fixed; (these being generally constructed of timber varying with every change of the atmosphere, had to be made true each time by grinding the full parts from the ends of the wires.) The cylinders and rollers were not carefully constructed so as to run with a steady motion.

The fixings for carrying the different journals were not capable of a fine adjustment, neither were they steady after being set. These defects prevented the cards working sufficiently near to each other without occasionally coming in contact, which destroyed the carding point. The above defects are now overcome by using iron instead of wood, and by the aid of machinery in the construction. The moving parts are capable of fine adjustment, and are as firm as the fixed ones when set. These improvements in construction cause less grinding and stripping to be required, as the finer and truer the points of the wire can be maintained, the clearer will be the card.

THE DRAWING FRAME (EIGHTH PROCESS).—By this process, the cotton already cleaned, carded, straightened, partially drawn and formed into ribands or slivers, is

doubled and further drawn by passing a number of those ends or slivers—say about six—over guides depressed by the weight of the sliver, through a series of four pairs of rollers, each pair travelling at a different speed; the difference in this case between the first and the fourth pair being about as one is to six, that is to say, that the circumference of the fourth roller travels through a space six times greater than the circumference of the first pair, and by so doing elongates or draws the sliver thus passed to six times the original length, and forming a single web, which is passed through a funnel to a pair of callender rollers, through which it passes to a coiling motion which deposits it in a revolving can, as described in the carding engine.

The sliver thus deposited being doubled six times and drawn six times is the same weight or thickness per yard as each of the slivers received by the back roller, and the object sought by this is to equalize the quality of the cotton and to make the slivers of uniform strength and texture by the combination. This process is repeated three times in this machine, and the amount of doubling and draft is equal in each case, say 216.

The guides depressed by the sliver in passing to the back rollers act as stop motions when the sliver breaks or runs out, by being thus released and coming in contact with a spider having a circular vibratory motion communicating to it through a catch box connected with a strap fork.

ONE DRAWING FRAME, with three heads of three deliveries each, four rows of rollers, the front row of steel made by the Bessemer process, and the back row fluted with coarse flutes, Leigh's top rollers to the front row, and coarse fluted top rollers to the back row, fitted with stop motions, coilers, and revolving can motions, and improved flats with endless traversing cloth, for cans 36×9 in. (exhibited).

The novelties introduced are in the use of rollers made from Bessemer's steel, Leigh's top rollers with revolving bosses, for front row; in an improved top clearer or flat which hangs upon hinges, and is provided with an endless cloth which clears the top rollers by travelling over them; its advantages are, a saving of power, labour, oil, and roller leather, it is much cleaner than the ordinary flat, there is less friction, and consequently less heat and electricity; the oil is less fluid, and the greasing of the pivots of the rollers is much better, facility of inspection is much greater, and the "flat waste" is never taken away by the sliver; in a stop motion for stopping the machine when the sliver breaks betwixt the front rollers and the callender, and which is driven from the same shaft and catch box as that used when the sliver breaks betwixt the can and the back roller.

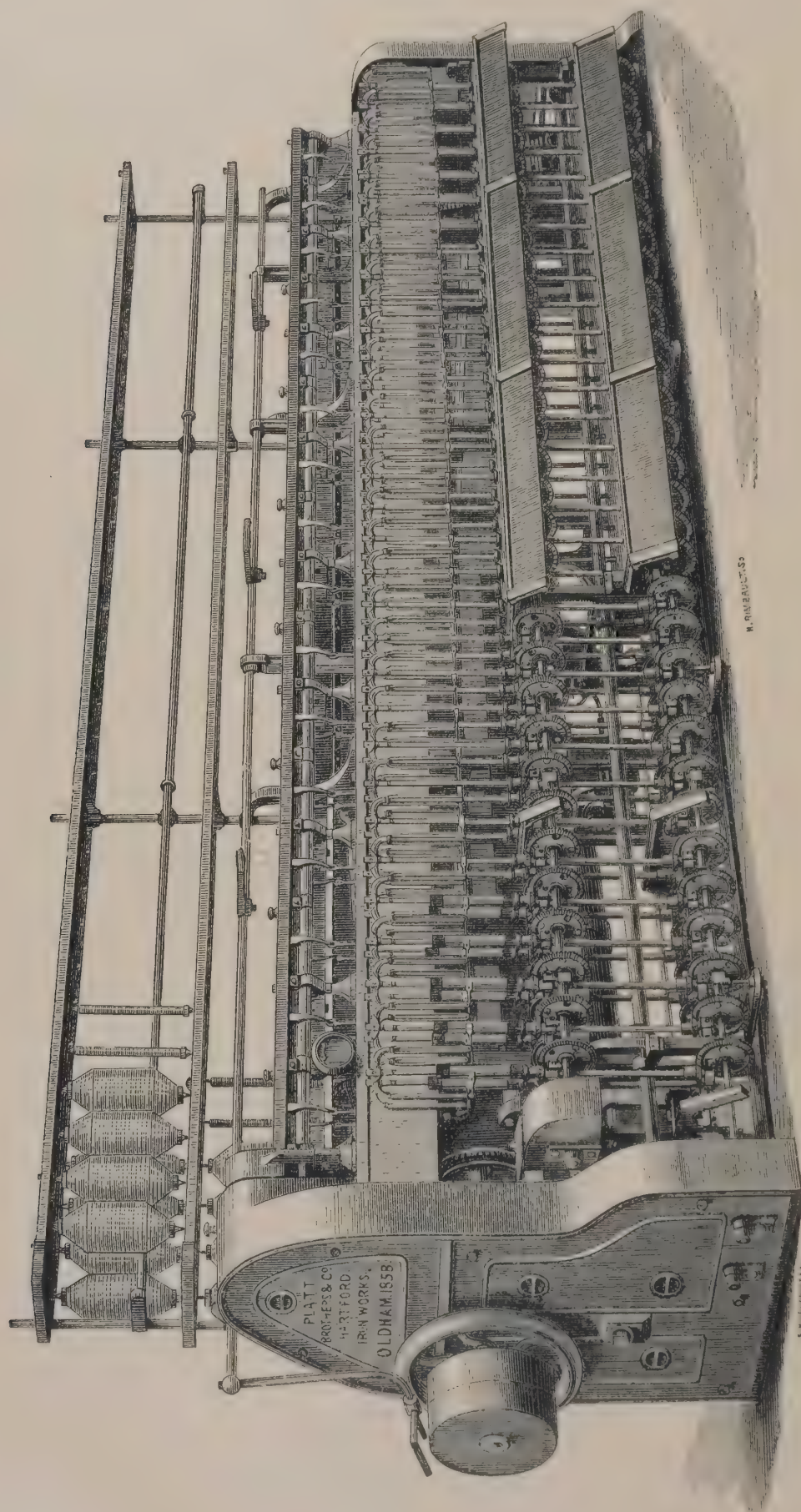
THE SLUBBING, INTERMEDIATE, AND ROVING FRAMES (NINTH, TENTH, AND ELEVENTH PROCESS).—The single slivers of cotton delivered in the last operation of the drawing frame are now conveyed in their cans to the back of the slubbing frame. This frame is furnished with guides similar to those described in the drawing frame, over which the ends pass to a series of three pairs of rollers revolving at varying speeds, the speed of the first pair being to the speed of the last in the proportion of one to five, so that the sliver is again increased in length five times in passing through them. In front of these rollers are two rows of spindles which are furnished with flyers having two hollow legs, and upon these spindles, bobbins about 11 in. long are threaded. These spindles and bobbins are both made to revolve, but at varying rates, and from distinct and separate movements.

The cotton, now called slubbing, delivered by these rollers is partially spun or twisted by the revolutions of the spindles, passes through the hollow legs of the flyers, and is wound upon bobbins; two of these bobbins are then filled into the creel of the intermediate frame; the slubbings

PLATT, BROTHERS, & Co., *continued.*

are then doubled by passing the ends of two of them through another series of three pairs of rollers, and joining, drawing, twisting, and winding them upon bobbins about

9 in. long, which are revolving upon spindles in front of the delivery rollers as before; two of these bobbins are then doubled in the creel of the roving frame, the process



ROVING FRAME.

of drawing, twisting, and winding is again repeated, and the cotton, now called roving, is wound upon bobbins about 8 in. long, ready for being spun in the mule and

throstle. The twisting of the cotton, after being delivered by the rollers of these machines, is effected by the revolutions of the spindles, the slubbing or roving is passed

PLATT, BROTHERS, & Co., *continued.*

through a hole on the top of, and down one of the legs of the flyer to its finger or presser, round which it is coiled, and delivered to the bobbin; this presser hangs loosely upon the flyer leg, but is parallel with and carried round by it at a uniform rate, causing a uniform pressure to be given to the bobbin through its weight and the resistance of the air in its circuit. As the bobbin is being wound, it is caused to traverse up and down the spindle against the finger, so as to equally distribute the roving. The winding of the roving upon the bobbin is regulated by increasing or diminishing its speed accordingly as the bobbin follows the flyer or the flyer follows the bobbin. Frames are made in both ways.

When the bobbin follows the flyer its speed must be increased as its diameter increases by winding, or the roving will be irregularly stretched or broken.

The speed of the front roller delivering the roving and the speed of the spindle which twists it is constant.

In these frames the bobbin follows the flyers, and the first motion communicating with the bobbin is at its greatest speed when the bobbin begins to wind, the speed gradually diminishing as the layers are wound on. This diminution of speed is effected by moving a strap upon two conical drums, one concave and the other convex, the speed of the concave drum is constant; these drums also communicate motion to a rail which, in its up and down motion, traverses the bobbin upon the spindle, and by this means regulates the speed of this traverse to suit the increased diameter of the bobbins.

The length of these drums is arranged to suit the diameter of the bobbins to be filled, so that when the strap has been traversed across the drum, the bobbin has attained its full dimensions when the frame knocks off.

The bobbins being now filled, are taken off and exchanged for empty ones; the end of the convex drum is raised so as to release the strap, which is wound back to the opposite end of the drum by means of a rack and pinion, and the frame is ready for starting again.

ONE SLUBBING FRAME of 42 spindles, three rows of rollers, with Leigh's top rollers to the front row, back rows (top and bottom) fluted with coarse flutes. Double centrifugal pressure for bobbins 10 in. lift by 5 in. diameter, fitted with stop motions, indicator and improved flat with endless traversing cloth (exhibited).

ONE INTERMEDIATE FRAME of 60 spindles, three rows of rollers with Leigh's top rollers to the front row, back rows (top and bottom) fluted with coarse flutes. Double centrifugal pressers, for bobbins 9 in. lift by $4\frac{1}{4}$ in. diameter, with iron creels, indicator, and improved traversing top clearer or flat (exhibited).

ONE ROVING FRAME of 84 spindles, three rows of rollers with Leigh's top rollers to the front row, back rows (top and bottom) fluted with coarse flutes. Double centrifugal pressers for bobbins 7 in. lift by $3\frac{1}{4}$ in. diameter, with iron creels, indicator, and improved traversing top clearer or flat (exhibited).

The novelties introduced in these machines, are Leigh's front top rollers with revolving bosses and coarse fluted back rollers (top and bottom) for better holding the cotton; in an improved flat with its endless travelling cloth which hangs upon hinges as in the drawing frame; more complete casing-up of the working parts; more convenient arrangement of setting-on and knocking-off rods, and in more effective and economical lubricating arrangements.

THE THROSTLE (TWELFTH PROCESS).—These machines are generally used for spinning yarn, for making warps, and winding it upon small bobbins; they have also been sometimes arranged for spinning weft and winding it in the form of cops, but never with good practical results, and always at a cost of increased complication in the

mechanism. They are used for spinning from 40s. downwards.

The creel for supporting the bobbins filled with rovings to be spun by the throstle, is placed on the top of the frame between two sets of three pairs of rollers, and which travel at varying rates, the variation in this instance between the first back roller, and the third or front, being about one into eight. Through one of these three pairs of rollers each roving is drawn and afterwards passed through an eylet or guide wire, which is fixed in a bar of wood (hinged to the beam for supporting the rollers), and whose position when at work is immediately over the centre of the revolving spindles which twist the yarn; one row of which is supported by rails, parallel with and perpendicular to the rollers on each side of the machine. The tops of these spindles are furnished with flyers, round one leg of which the thread is coiled and passed through another eylet at the bottom to a bobbin which is threaded upon the spindle, and upon which the yarn is wound. The lower rail or bar for supporting the spindles, is fixed, and the upper one is movable, and upon it the bobbin rests; this rail or bar has an up and down motion given to it by means of racks and pinions in communication with a heart cam; the bobbin is thus moved up and down the spindle past the eylet of the flyer, and the yarn is equally distributed upon it in winding.

The motion of the bobbin round the spindle is variable, and is obtained from the tension of the yarn whilst winding, and as the revolutions of the spindle and flyer cause the yarn to drag the bobbin after them, and the weight and friction of the bobbin upon the movable rail acts as a break, the yarn is wound tight on its surface.

ONE THROSTLE of 152 spindles, 2 in. lift, three rows of rollers, Leigh's front top rollers, middle and back rollers self-weighted, lifting rails, top and bottom oiling plates (exhibited).

The novelties introduced are as follows—Oiling plates for both bottom and top spindle rails the whole length of the machine, which can be lifted by racks so as to allow the attendant to oil the whole of the spindles without interruption; also in an improved iron creel plate fitted with steel pegs for the tin tubes of the roving bobbins to revolve upon, and in an arrangement by which yarns of one count may be spun on one side of the machine, whilst those of another count are being spun on the opposite side.

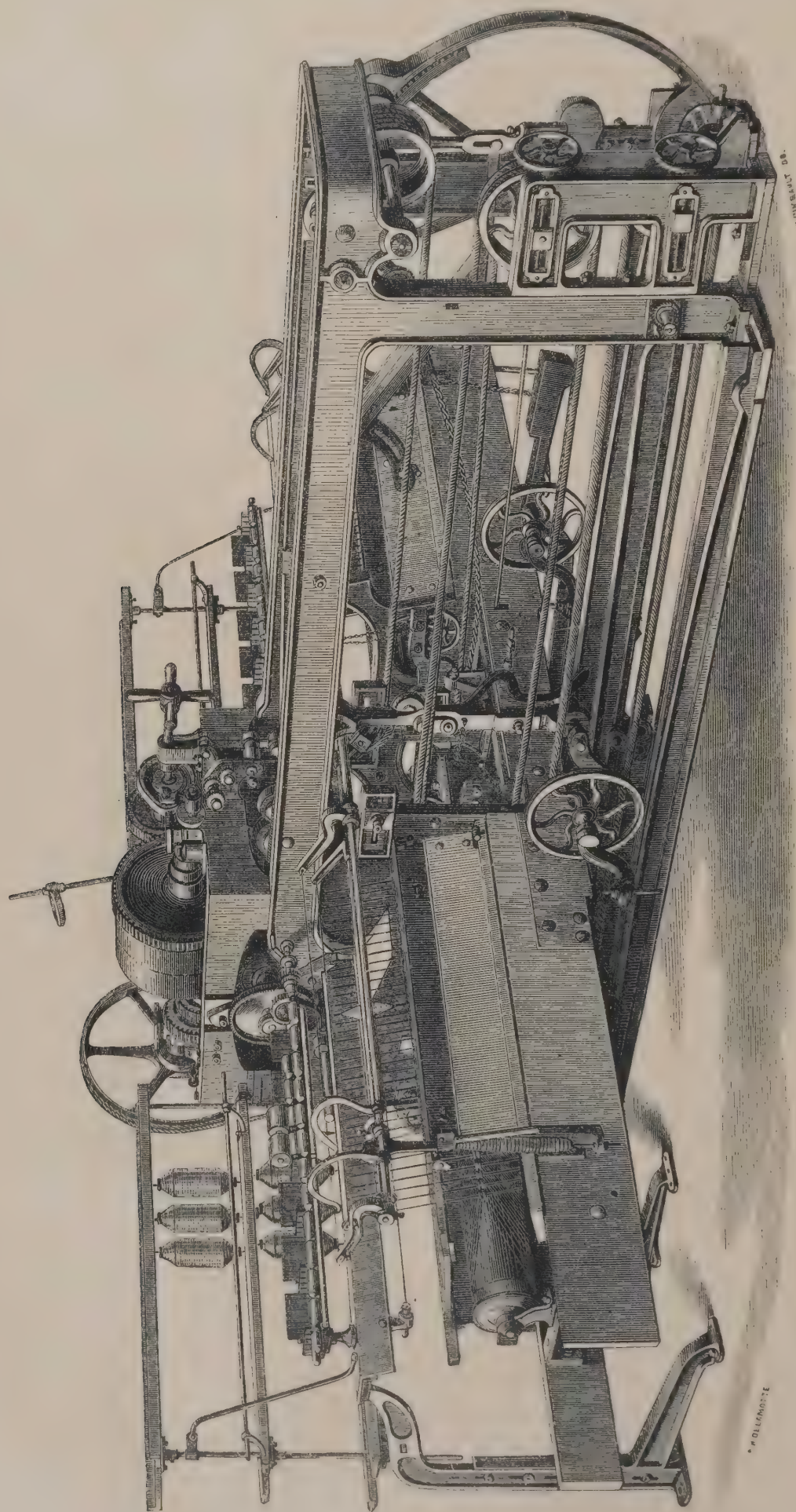
SELF-ACTING MULE FOR SPINNING COTTON.

TWELFTH PROCESS (a).—These machines are used for drawing and twisting into yarn the rovings as prepared by the machinery before described, and coiling or winding it upon spindles in the form of cops by automatic means. Like the common hand mule jenny, this machine may be divided into two principal parts, one part fixed, and comprising the creels for supporting the bobbins, the rollers for drawing or elongating the fibres, the frame-work or headstock containing the movements for effecting the changes required in the operation, and for communicating motion to the movable portion of the machine called the carriage, which supports the spindles and the drum for imparting motion to them, and which is made to traverse in and out from the rollers upon iron rails or slips as the yarn is being drawn out or wound upon the spindles. The average length of this traverse or draw is about 63 in.

As the fibres of the roving are being drawn and delivered by the rollers, the carriage is caused to move from the rollers until it arrives at the end of the stretch, when it stops; the rollers and drawing-out motions are disengaged, the twist motion is acting, the spindles continue to revolve, until the quantity of twist necessary to be put in the yarn has been given, the change is then

PLATT, BROTHERS, & Co., *continued.*

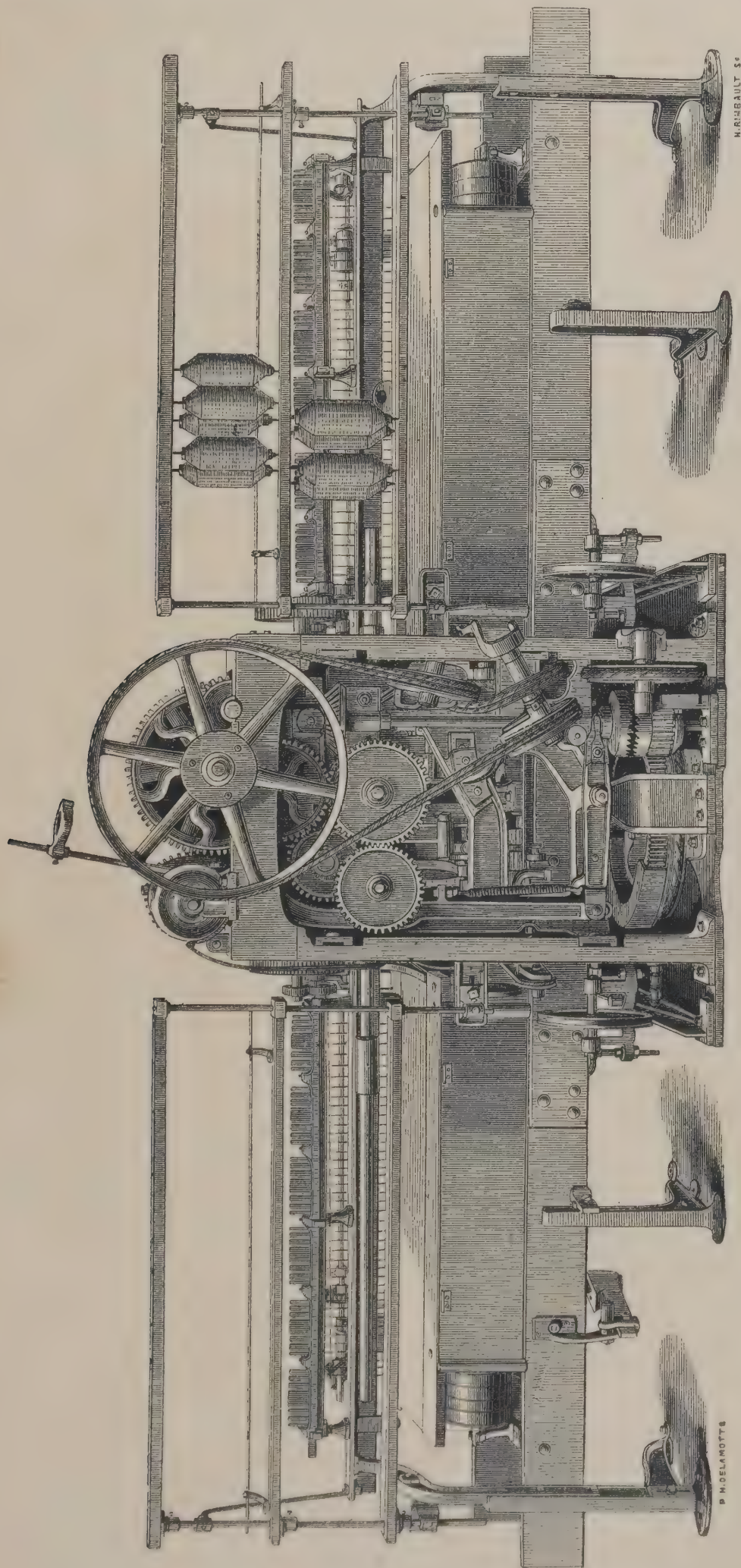
made from the twist to the backing off, by causing the direction of motion of the spindles to be reversed, and the yarn to be uncoiled a little, so as not to break by the depression of the faller wire upon it. The winding-on



SELF-ACTING MULE FOR COTTON.

and taking-in changes are then made, the carriage advances to the rollers, the yarn is wound upon the spindles, and the operation is complete. The different changes are effected by means of a cam

PLATT, BROTHERS, & Co., *continued.*



BACK OF SELF-ACTING MULE.

shaft in connexion with the long lever, which is acted upon by the traversing in and out of the carriage, the locking of the faller, and the revolution of the twist motion.

PLATT, BROTHERS, & Co., *continued.*

ONE SELF-ACTING MULE of 648 spindles $1\frac{3}{8}$ in. distance, $16\frac{1}{2}$ in. spindles, three rows of rollers for two threads to each boss, Leigh's front top rollers, spindles driven by tin rollers, plate footsteps and bolsters, iron creels for single roving, back-shafts, and driven direct from the main-shaft (exhibited).

The novelties in this machine as exhibited and illustrated are :—

1. The introduction of foundation plates for supporting the headstock or principal framing of the fixed portion of the machine, the iron rails or slips upon which the carriage traverses, and the copping and taking-in motions, thus entirely preventing derangement of the working parts from deflection or bad floors.

2. The improved arrangement for driving the cam shaft by gearing instead of by friction, making the motion positive, and causing a more certain and noiseless action of the changes.

3. Simple and direct arrangement of rim or twist band (called double banding), by passing the band twice round the rim and all other twist pullies for driving the spindles, by which means we can work with slacker bands, have less strain in the bearings, less wear and tear of band, and a greater regularity of twist in the yarn.

4. A new taking-in motion, which is differential without having an eccentric band pulley or scroll. The circumference of the concentric pulley now used being equal to the length of the draw, stretch, or traverse of the carriage, gives to the band one uniform tension, ensuring greater delicacy of action in working, much greater durability, and less breakage of taking-in bands.

This motion being firmly fixed upon the foundation plate, and being connected directly with the carriage, has no tendency to lift it from the rails during its traverse.

5. Simple construction and arrangement of copping and faller locking motions with double copping plates, by which the copping rail may be taken out in any stage of the cop's progress, without disturbance of its working position.

6. The application of a governor or cop regulator for adjusting the winding-on motion to the formation of the cop, which is perfectly automatic throughout.

7. Improved construction of carriage or movable portion of the machine, and in the manner of connecting the square and the carriage together, combining greater accuracy, strength, and neatness ; and in the position and arrangement of the diagonal rods for strengthening the same ; and

Lastly. In the general construction and adaptation of the framing to form a casing to the working parts of the machine, the facilities for making changes when required for spinning varied numbers, in the introduction of a friction coupling, through which motion is transmitted to the taking-in motion, and which may be so adjusted as to slip in cases of obstruction to the free traverse of the carriage, thereby preventing breakages in the machine and banding.

GRINDING MACHINE used for grinding and sharpening the teeth of the cards on the rollers and flats of the carding engines.

WRAP DRUM AND SCALES, for measuring and weighing rovings.

WRAP REEL AND SCALES, for measuring and weighing yarns.

SET OF TACKLE, for nailing on cards.

ROLLER ENDING MACHINE.

MACHINE for forcing leathers on top rollers.

CASES containing samples of bottom and top rollers, spindles, flyers, and bobbins.

CASE showing cotton in its various stages of manufacture.

CASE, showing wool in its various stages of manufacture.

SET OF PHOTOGRAPHS of the machinery exhibited.

ONE POWER LOOM, 38 in. reed space, for weaving plain calicoes for shirtings, any kind of twills, fancy goods in cotton, or fine woollen, union cloth with cotton warp and woollen weft, fine linen goods or union cloths with cotton warp and linen weft (exhibited).

The novelties introduced are :—

An improved picking motion, which is worked from the first motion or crank shaft ; the picking shaft is provided with loose tongues, which are acted upon by cams every alternate revolution of the crank shaft ; this arrangement is exceedingly simple, is little liable to wear, and can easily be repaired in case of accident.

An improved surface taking-up roller, without glass or emery, and which is applicable for either light or strong goods.

An improved self-acting temple, and a new buffer or check-spring (instead of check-strap), to prevent breakage of cops or bobbins in the shuttles of the looms.

PREPARING WOOL.

Wool is prepared for the carding engine, first by shaking and having the dust extracted from it by a machine similar to that illustrated for opening cotton, and afterwards by oiling, for the purpose of softening it and preventing the short fibre from flying.

Dyed wool is also passed through a similar machine to be cleaned, and for the purpose of extracting the spent dye-wood from it, before being oiled.

CARDING WOOL.

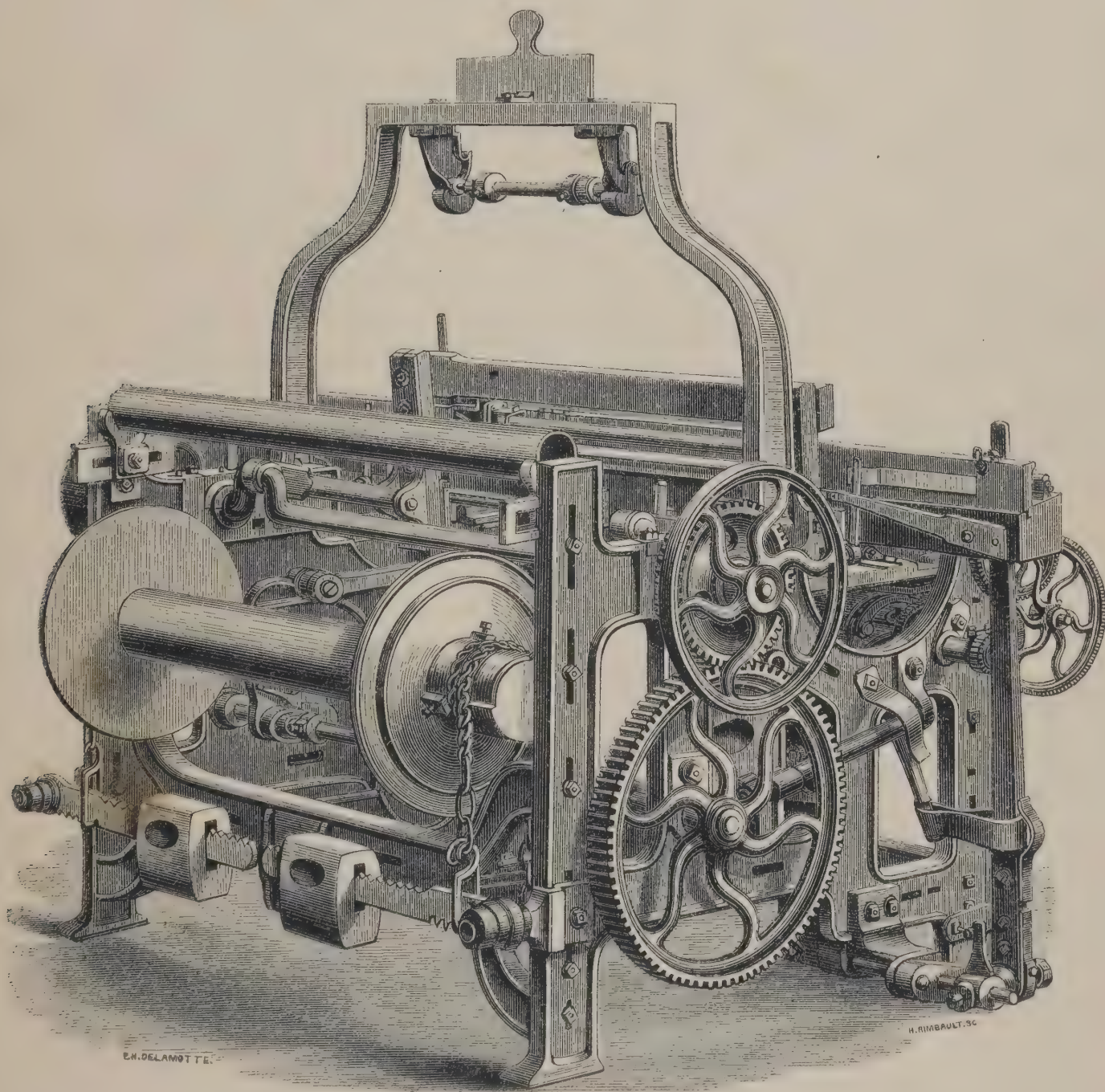
Wool passes through a series of three machines in this process ; viz. the "scribbler," the "intermediate," or second card, and the finisher card and "condenser," and is supplied to the first on an endless travelling lattice, which has its surface divided into a number of equal parts, and upon each of which a given weight of wool is spread. This lattice carries it to a pair of feeding rollers, which draw in and deliver it to a taker-in roller that carries it on its upper surface under a guard roller to the breast cylinder ; this taker-in roller is formed of cast-iron, with a fine groove or thread cut on its surface, and into this groove is pressed the lower edge of a flat wire, whose upper edge is cut into teeth like those of a fine saw, so that it has the appearance of a roller with a number of fine saws placed at short intervals. The object of these teeth is to stretch the fibres until they are released by the feed rollers, when they pass forward in the spaces betwixt them, and any burrs or impurities that are carried on the surface of the wool are driven back by the guard roller which revolves at a quick speed, and has a number of ribs fixed longitudinally on its surface. This roller is so placed that its ribs clean from the points of the teeth any refuse, and deposit it in a box placed over the feed rollers to receive it. The taker-in roller is stripped by a clearer roller which passes the wool to a breast cylinder having two rollers and clearers revolving in suitable bearings over it to be broken up and prepared for the main cylinder. The breast cylinder is stripped by a clearer, which passes the wool to a large

PLATT, BROTHERS, & Co., *continued.*

cylinder, over which revolve four rollers and four clearers for carrying on the carding process, and a large roller, called a "fancy," covered with long toothed cards, and whose surface travels faster than that of the cylinder, the object of which roller is to prevent the cards of the cylinders from being clogged with grease and wool, to raise the wool to the surface, and to deliver it to the surface of the doffing cylinder, from which it is stripped

by a vibratory comb, as described in the cotton-carding process.

The fleece thus stripped from the doffer is formed into a sliver by being drawn through a revolving tube by means of a pair of rollers that are placed in front of the doffer, at one end of it, from which it falls upon an endless travelling cloth just over the floor, to be then conveyed to the second or intermediate card.



LOOM.

ONE SCRIBBLER ENGINE, 60 in. on wire, with common hand-spreading lattice feeder, one 12 in. patent burring roller, with guard and dirt box, working from patent feed rollers, with patent stripper, breast roller 27 in. diameter, with two rollers and two stripping rollers; cylinder 45½ in. diameter, with four stripping rollers, four rollers and fancy; doffer 22 in. diameter; roping apparatus, and floor creeper (exhibited).

ONE INTERMEDIATE, OR SECOND CARDING ENGINE, 60 in. on wire, with Apperley & Co.'s patent diagonal feeding machine, patent taker-in 7 in. diameter, with

stripper 7 in. diameter; cylinder 45½ in. diameter, four stripping rollers, four clearers, and fancy; doffer 22 in. diameter (exhibited).

The sliver delivered by the scribbler card is formed into a fleece to supply this machine by an apparatus known as "Apperley's feeder," by taking the slivers from the travelling cloth, over the floor, and laying them in lines close to each other upon a number of endless travelling webs, which are driven by a shaft parallel to the feed rollers. These webs are of increased lengths, from side to side of the machine, so as to form an angle

PLATT, BROTHERS, & Co., *continued.*

to the feed rollers. By this means, the slivers pass obliquely, and a number of them are presented at the same time to the feed rollers, insuring greater uniformity of fleece; which, after having passed the feed rollers, is acted upon by the first of 2 taker-in rollers, about 7 in. diameter. The first of these is covered with saw-like teeth (as described in the "scribbler"), and the second is covered with cards, and is by them passed to the main cylinder, which conveys it to the doffer, whilst the process of carding is going on with the rollers, clearers, and fancy, as before described in the "scribbler engine."

This doffer is also stripped by a comb, and delivered in a thin fleece to a travelling lattice supported on rollers, which are carried by levers in the form of a pair of compasses, and having one point fixed, and the other moving, with a small carriage on rails, which also carries two tin rollers. By this lattice and rollers the fleece is deposited in layers across the feeder lattice of the

FINISHER CARDING ENGINE,

which is placed at right angles to the intermediate, and which moves with a slow motion, so that each layer is placed a little behind the preceding one. This system of moving lattices is known as "Ferrabee's feeder," and its object is to lay the fibres so as to enter the feed rollers of the condenser card crosswise, to be again straightened and taken forward by two takers-in to the cylinder, rollers, and clearers, to be carded and passed to the doffer, upon the surface of which the fleece is now spread uniformly. The next operation is to strip it off in a number of small slivers or bands, and is called

CONDENSING.

There are a great variety of machines constructed for this purpose; the one exhibited is of recent contrivance, and is patented and known as "Fairbairn's condenser." Its novelty consists in having small grooves cut round the doffer in equal divisions, and placing in each a thin blade of steel level with the point of the cards, where they receive the fleece from the cylinder. This steel blade follows the face of the cylinder at a short distance, therefore projects above the cards of the doffer so as effectually to divide the fibres that lay across this line, when they are taken by the side which has the firmest hold; they now pass under the doffer and are stripped by a plain card roller placed in the front of the doffer, and which conveys them to two endless travelling sheets of leather. Each sheet is carried on two rollers and vibrates in contrary directions, so as to rub them into round felt slivers or bands, to be wound on to two bobbins by surface contact with two rollers, so that each bobbin contains one-half of the threads delivered.

These bobbins are then filled into the creel of the self-acting mule.

Note.—For some qualities of woollen yarn the fleece is stripped from the doffer in bands, which are afterwards joined together by the piecing machine, and wound

upon bobbins to be filled into the creel of the self-acting slubbing mule, to be partially spun and wound upon bobbins to supply the creel of the self-acting mule.

FINISHER CARDING ENGINE AND CONDENSOR, 42 in. on wire, Ferrabee & Co.'s patent bat feeding machine up to patent feed rollers and strippers, patent taker-in 7 in. diameter, with stripper 7 in. diameter, cylinder 45½ in. diameter, four stripping rollers, four rollers and fancy; doffer 22 in. diameter, with Fairbairn's patent condensor, to deliver forty good threads and two waste ends (exhibited).

SELF-ACTING MULE FOR WOOL, 380 spindles, 2 in. distance, 18 in. spindles, to spin either upon the bare spindle, or upon wooden or tin spools, and from condensor or slubbing bobbins, either warp or weft yarn (exhibited).

The improvements and novelties introduced in connexion with the self-acting mule for cotton-spinning, are also introduced into this machine, in addition to which we have also introduced:—

A "double speed" or fast and slow motion of the spindles with two rims, the change being obtained by a traverse of the strap and two rims without the aid of either counter shaft or gearing, the rim out of action in each case being converted into a carrier pulley, enabling us to retain the double banding arrangement.

In a motion for giving out the necessary length of slubbing to be spun, which is so connected with the camshaft, as to give a simultaneous action of the delivering rollers and the drawing-out motion.

In a simple arrangement of a receding motion of the carriage during the twisting of the yarn, and which may be regulated to recede quickly or slowly, as the fineness of the yarn and the amount of twist may require.

In a simple arrangement for regulating the length of draw or traverse of the carriage, in accordance with the running up of the yarn and the recedence of the carriage.

The cards in use in these machines are made by—

For Cotton, Messrs. Joseph Sykes & Brothers, Lindley, near Huddersfield, and Mr. William Horsfall, Great Bridgewater Street, Manchester.

For Woollen, Messrs. R. & C. Goldthorpe, Cleckheaton, near Leeds.

The bobbins and skewers are supplied by Messrs. Lawrence, Wilson, & Sons, Cornholm Mills, near Todmorden, and the banding by Mr. Samuel Green, King Street, Oldham.

Messrs. Samuel Radcliffe & Sons, of Rochdale, and Messrs. Radcliffe Brothers, of Lower House and Wallshaw Mills, Oldham, are working the cotton machinery.

Messrs. H. & L. Newall, of Littleborough, near Manchester, and Messrs. the Executors of George Lawton & Sons, of Micklehurst, near Mosley, are working the woollen machinery.

The engine driving the machinery is made by Messrs. B. Hick and Son, Bolton.

Prices may be had on application to—

Messrs. PLATT, BROTHERS, & Co., in the Exhibition; at their Works, in Oldham; and at their Offices, St. Ann's Square, Manchester.

And from their Agents—

<i>Russia</i>	{ Messrs. DE JERSEY & Co., Manchester, St. Petersburg, and Moscow.
<i>France, Belgium, Holland, Prussia, Bavaria, Italy</i> <i>and Savoy, Sweden and Denmark</i>	
<i>Saxony and Bohemia</i>	Messrs. E. NATHAN & SINGTON, Manchester.
<i>Vienna and Switzerland</i>	Mr. W. W. DERHAM, Leipsig.
<i>Spain</i>	Mr. F. E. SCHOCH, Vienna and Switzerland.
	Mr. JAMES SYKES, Barcelona.

[1532]

SHARP, STEWART, & Co., *Atlas Works, Manchester*.—Reel-winding machine, for silk, linen, or cotton sewing-thread.

[1533]

SMITH, WILLIAM, & BROTHERS, *Heywood, Lancashire*.—Woollen looms ; jacquard damask loom, and half-woollen loom.

[1534]

SMITH & Co., *Stratford*.—Machine for separating cocoa fibres.

[1535]

STUART, JOHN & W., *Musselburgh, near Edinburgh*.—Patent fishing-net weaving loom.

[1536]

THOMPSON, JAMES, & Co., *Kendal*.—Card clothing.

[1537]

TUER & HALL, *Hope Foundry, Bury, near Manchester*.—Shearing machine, looms.

1. LOOM FOR WEAVING LINENS, strong fustians, nankeens, velvets, ticks, jacquard work, woollen goods, &c. This loom is applicable by a change of tapets at the end for weaving any kind of cloths, and may be worked at any required speed.

2. GINGHAM OR FANCY LOOM with rising and falling box, to weave one pick or more of each colour as may be desired, suitable for weaving gingham, checks, plaids, drills, quiltings, light fustians, nankeens, heavy domestics, plain and twilled calicoes, &c.

3. CARPET LOOM to weave pile fabrics of any width required, invented in 1857. All the working motions are outside the loom, except the crank from which it is driven, by which free access to the working parts is

obtained. The wire motion inserts 45 wires per minute at 2 picks per wire. This loom is also applicable to the weaving of Utrecht velvet for the lining of carriages, omnibuses, &c. One horse-power will turn 6 of these looms.

4. SHEARING OR CUTTING MACHINE with 2 revolving cylinders, 5 steel cutters on each cylinder for shearing fustian, velvet, and moleskin cloths, &c.; can be made on the same principle with 1 cylinder only at about two-thirds cost. The cylinders can be made of a larger or smaller diameter, with more or less cutters, as may be desired.

Prices and lithographs may be had on application to the makers.

[1538]

WALKER & HACKING, *Bury, Lancashire*.—Machinery for opening, scutching, preparing, and spinning cotton yarn.

[1539]

WARD, GEORGE, 77 *Darwen Street, Blackburn*.—Heald-knitting machine.

[1540]

WATKIN, S., *Bradford*.—Washers' rods for silk frames.

[1541]

WILSON, LAWRENCE, & SONS, *Cornholme Mills, Todmorden, near Manchester*.—Bobbins, tubes, spools, skewers, bosses, clearers, &c. (See page 34.)

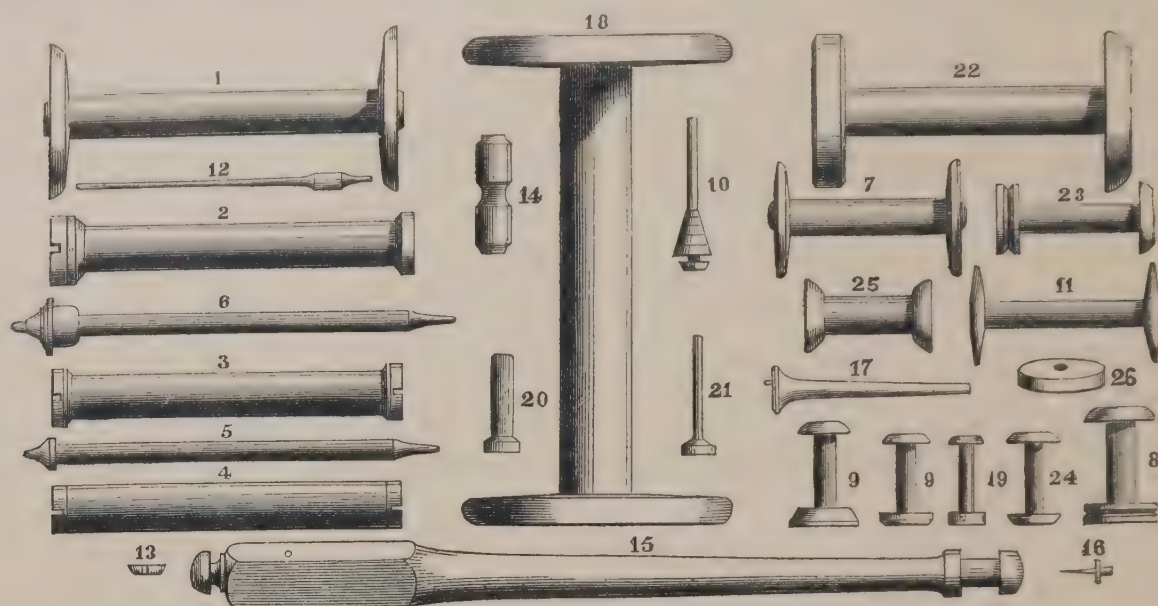
[1542]

WHITESMITH, I., 29 *Govan Street, Glasgow*.—Power loom with six shuttles and twilling combined.

[1543]

WREN & HOPKINSON, *London Road, Manchester*.—Machinery for manufacturing cotton sewing-thread and spinning silk. (See page 35.)

WILSON, LAWRENCE, & SONS, *Cornholme Mills, Todmorden, near Manchester.*—Bobbins, tubes, spools, skewers, bosses, clearers, &c.



COTTON PREPARATION.

1. Slubbing soft bobbin.
1. Intermediate ditto.
1. Roving ditto.
- Ditto fine ditto.

PATENT LONG COLLAR PRESS.

2. Slubbing tube, hooped.
2. Intermediate ditto.
2. Roving ditto.

COMMON PRESS TUBES.

3. Slubbing, beaded ends.
3. Intermediate ditto.
3. Roving ditto.
4. Slubbing, plain ends.
4. Intermediate ditto.
4. Roving ditto.

SKEWERS FOR BOBBINS OR TUBES.

5. Slubbing, lancewood, or ash, and footed.
5. Intermediate ditto ditto.
5. Roving ditto ditto.

SKEWERS FOR PATENT COLLAR TUBES.

6. Slubbing, ash and footed with box.
6. Intermediate ditto ditto.
6. Roving ditto ditto.

WARPING AND SPINNING.

7. Warping bobbins.
7. Warping bobbins, feather edges.
7. Winding ditto.
8. Doubling ditto, for wet, solid.
- Ditto ditto, for dry, jointed.
9. Throstle ditto, plain or painted.
9. Ditto ditto, Wilson's improved.
9. Ditto ditto, metal bushed.
10. Pin ditto, soft or hard wood.
- Sally ditto ditto ditto.
- Weaver's ditto.
11. Gasing ditto.
- Bolling ditto.

MISCELLANEOUS.

12. Twiner's skewers, lancewood.
- Reeler's cop ditto ditto.
- Warping ditto ditto.
13. Spindle cop braids, box.
14. Throstle top clearers.
- Ditto under ditto.
- Mule top clearers.
- Ditto under ditto.
15. Picking sticks, turned.
- Ditto ditto, flat.
16. Carr's patent bobbin nails.

WOOLLEN PREPARATION.

Condenser bobbins.

1. Sliver ditto.
7. Twister ditto.
17. Warp ditto.
17. Weft. ditto.

WORSTED PREPARATION.

18. Drawing bobbins.
18. 1st finisher ditto.
18. 2d ditto ditto.
18. Roving ditto.
7. Warping ditto.
19. Spinning ditto.
20. Spool ditto.
21. Do. shell ditto.

FLAX AND SILK PREPARATION.

22. Large headed bobbins.
- Small ditto ditto.
23. Spinning bobbins, large.
24. Ditto ditto small.
- Box ditto ditto
25. Winding ditto
26. Bosses and pulleys.
14. Clearers, and all other kinds.

Prices will be cheerfully forwarded for any of the above, or other descriptions of bobbins, &c. (plain or painted and varnished), on receipt of full particulars of size.

Orders (for home or export) will be carefully and promptly attended to. Address, Cornholme Mills, Todmorden, near Manchester.

The following superior advantages and facilities possessed by L. W. & Sons for producing the best possible article at the lowest remunerative cost, enable them to make it especially advantageous to purchasers intrusting them with their orders.

1. Forty years' practical experience in the business as bobbin manufacturers.

2. Upwards of 300 hands employed, all trained by the firm, being the largest establishment of the kind in the united kingdom.

3. Inventors and sole proprietors of patent machinery which produces superior workmanship, and guarantees the greatest uniformity in shape and size.

4. Immense stocks of prepared and well-seasoned timber always on hand, enabling them to execute orders to any extent at a very short notice.

The following eminent machinists have kindly permitted their names to appear as references:—Messrs. Platt Brothers & Co., Oldham; Parr, Curtis, & Co., Manchester; William Higgins & Sons, Manchester; Joseph Hetherington & Sons, Manchester; Walker & Hacking, Bury; John Mason, Rochdale; John Tatham, Rochdale; Wilson & Longbottom, Barnsley; Lord Brothers, Todmorden.

WREN & HOPKINSON, *London Road, Manchester.*—Machinery for manufacturing cotton sewing-thread and spinning silk.

MACHINES FOR THE MANUFACTURE OF THREAD AND SEWING COTTON.

THROSTLE, to draw and spin the cotton into yarn or thread. Patent revolving weights.

DOUBLING MACHINE, to twist two or more ends of yarn together, forming sewing cotton or thread.

CLEARING MACHINE, to remove irregularities in the thickness of the thread.

BOBBIN REEL, to wind the thread from the bobbins into hanks for dyeing or bleaching.

HANK-WINDING MACHINE, to wind thread from the hank upon bobbins after dyeing or bleaching.

BALLING AND SPOOLING MACHINE, to wind thread into balls or upon small wooden spools or bobbins ready for the retail market.

CUBING PRESS, to make up small bundles of thread for sale.

BUNDLING PRESS, to press and pack thread or yarn into large bundles for exportation.

PIRN-WINDING MACHINE, to fill small shuttle bobbins used in weaving.

MACHINES FOR THE MANUFACTURE OF SILK FOR WEAVING AND SEWING.

WINDING MACHINE, to wind raw silk upon bobbins from the hank as imported.

PATENT SIZING MACHINE, to assort the silk into various degrees of thickness.

CLEANING MACHINE, to remove irregularities in the thickness of the silk.

SPINNING MACHINE, to twist or spin a single thread of raw silk.

DOUBLING MACHINE, to wind and twist together several ends of silk, detecting the breaking of any one during the operation.

THROWING MACHINE, to twist or spin two or more threads of silk into one of greater strength.

SOFT SILK WINDING MACHINE, to wind silk from the hank after dyeing ready for weaving.

PATENT STRINGING MACHINE, to stretch dyed silk while immersed in steam, giving lustre to the surface.

MACHINES EXHIBITED IN OPERATION :—

Pair of NON-CONDENSING HIGH-PRESSURE STEAM ENGINES, diameter of cylinder 10 in. stroke 20 in.

STEAM GAUGE, Allen's patent.

HYDRAULIC PUMPS, to work a press for packing textile goods for shipment.

SELF-LUBRICATING PEDESTALS, Möhler's patent.

SET OF IMPROVED STOP VALVES, 2 in. to 8 in.

SHAFTS, WHEELS, PULLEYS, &c. for giving motion to the machinery.



SUB-CLASS B.—*Machines and Tools employed in Various Manufactures.*

[1551]

ALCOCK, JOHN, *Prescot*.—Lathe ; upright tool with slide-rest on improved principle.

[1552]

ANNABLE & BLENCH, 28 *St. John Street, E.C.*—Patent horizontal printing machine for cheap and expeditious printing.

[1553]

ARMITAGE, M. & H., & Co., *Mousehole Forge, near Sheffield*.—Anvils, vices, hammers, &c.
Obtained the Prize Medal at the Exhibition of 1851.

[1554]

BARRETT, EXALL, & ANDREWES, *Reading, England*.—Patent aerated bread machinery (Dr. Daughlish's), and patent biscuit machinery.

[1555]

BERTRAM, GEORGE, *Sciennes Street, Edinburgh*.—80-inch paper making and cutting machine, fully mounted.

The exhibitor has had thirty years' experience in the manufacture of PAPER-MAKING MACHINERY. His manufactures include—

Every sort of useful CUTTING, WILLOWING, and DUST-ING APPARATUS, for rags, waste, or straw.

REVOLVING DRUMS, for washing rags.

WASHING, BEATING, AND POACHING ENGINES.

PAPER-MAKING MACHINES of all widths, with single-sheet cutters attached, of a new and improved description, or cutters to cut from 6 to 8 reels at one time.

All kinds of SIZING AND DRYING MACHINES, detached or in connexion with paper-making machine, so as to make, size, dry, and cut the paper in one continuous unbroken web.

ROLLING, CALENDERING, AND GLAZING MACHINES, for writing papers, in the web, single sheets, or in copper plates.

NEW AND IMPROVED ANGULAR CONDENSING STEAM ENGINES of all sizes, very economical and useful for driving every kind of machinery.

HEAVY AND LIGHT GEARING of every description.

[1556]

BESLEY, ROBERT, & Co., *Fann Street, Aldersgate Street, London*.—Type-casting machine in operation.

[1557]

BEYER, PEACOCK, & Co., *Gorton Foundry, Manchester*.—Wheel lathe to turn and bore up to 7 feet diameter ; and triple-headed slotting machine.

DOUBLE FACE-PLATE WHEEL LATHE, for turning railway wheels, and boring tyres up to 7 ft. diameter ; adapted to turn two wheels at once upon their axle without torsion, or to turn two wheels, or bore two tyres respectively ; or

to turn a wheel, or bore a tyre upon one face-plate, whilst boring or bossing a wheel upon the other, with additional driving gear upon both head-stocks for boring or bossing wheels at quick speeds.

[1558]

BISSELL, WILLIAM, *Union Street, Wolverhampton*.—Flooring and bench cramp ; machine for mortising wood ; lifting jack. (*See page 37.*)

[1559]

BOARD, CHARLES, 7 & 8 *Barton, Bristol*.—Veneering press for veneering large or small flat surfaces.

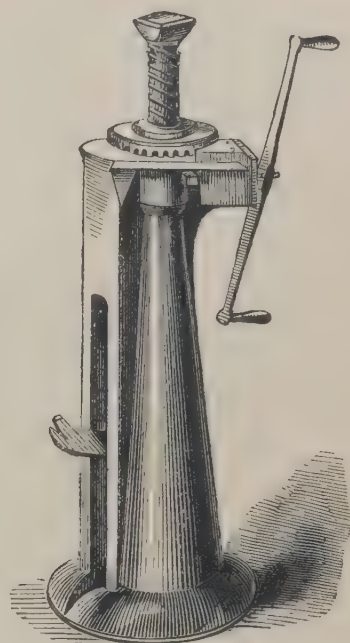
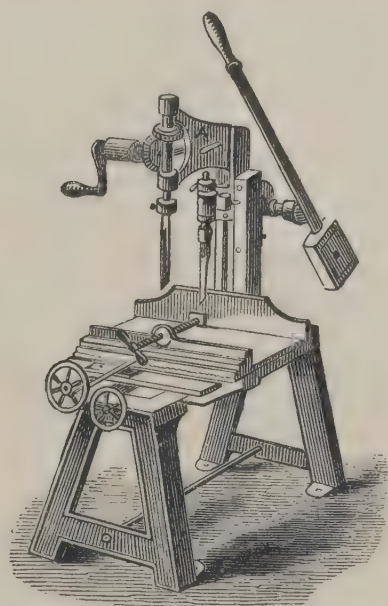
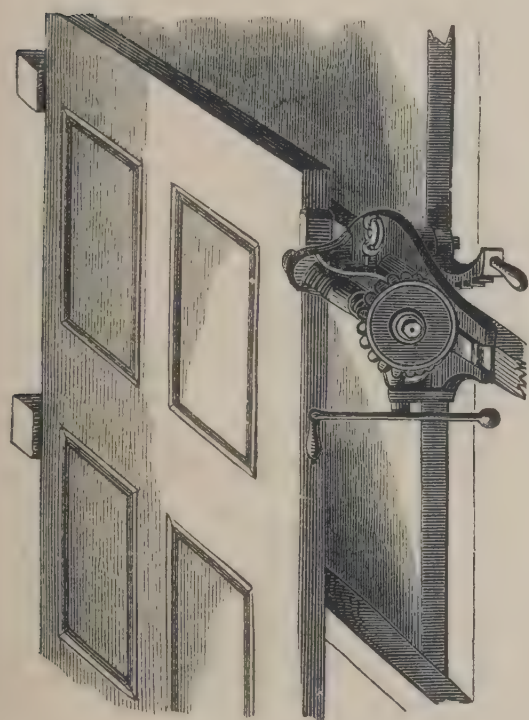
[1560]

BRADBURY & Co., *Rhodes Bank Foundry, Oldham*.—Manufacturing and domestic sewing machines and binding guides.

[1561]

BRADLEY & CRAVEN, MESSRS., *Westgate Common Foundry, Wakefield*.—Patent plastic clay brick-making machine. (*See page 38.*)

BISSELL, WILLIAM, *Union Street, Wolverhampton*.—Flooring and bench cramp; machine for mortising wood; lifting jack.



THE FOLLOWING ARE EXHIBITED :—
MORTISING MACHINE. This works upon a different and more powerful principle than any other mortising machine yet introduced. The power is obtained by an eccentric wheel working in a rack at the back of the slide, whereby greater leverage is obtained.

BISSELL'S PATENT FLOORING CRAMP. The force of this cramp is fully equal to 1 ton. It is adapted to joists from 2 to 4 in. and is the most expeditious and easy in working of any cramp in use.

BISSELL'S COMBINED LIFTING JACK.

[1562]

BRUNTON, J. D., *Barge Yard, Bucklersbury, E.C.*—Peat fuel, and machinery for preparation of same.

[1563]

BUCHTON, JOSHUA, & CO., *Well House Foundry, Leeds*.—Self acting engineers' tools.

[1564]

BUNNETT & Co., *Deptford, Kent*.—Brick-making machine.

[1565]

BURN, ROBERT, *Lochrin Engine Works, Edinburgh*.—Envelope and label dies.

[1566]

CARVER, WILLIAM, *Ducie Bridge Mill, and 5 Todd Street, Manchester*.—Sewing machines.

[1567]

CASSON, JOHN, *Wellington Street, Woolwich*.—Patent improved machines for dressing raisins, currants, and other dried fruits.

[1568]

CLARK, JOHN, *184 Buchanan Street, Glasgow*.—Automaton ruling machine, hand machine for envelopes, Albion embossing press.

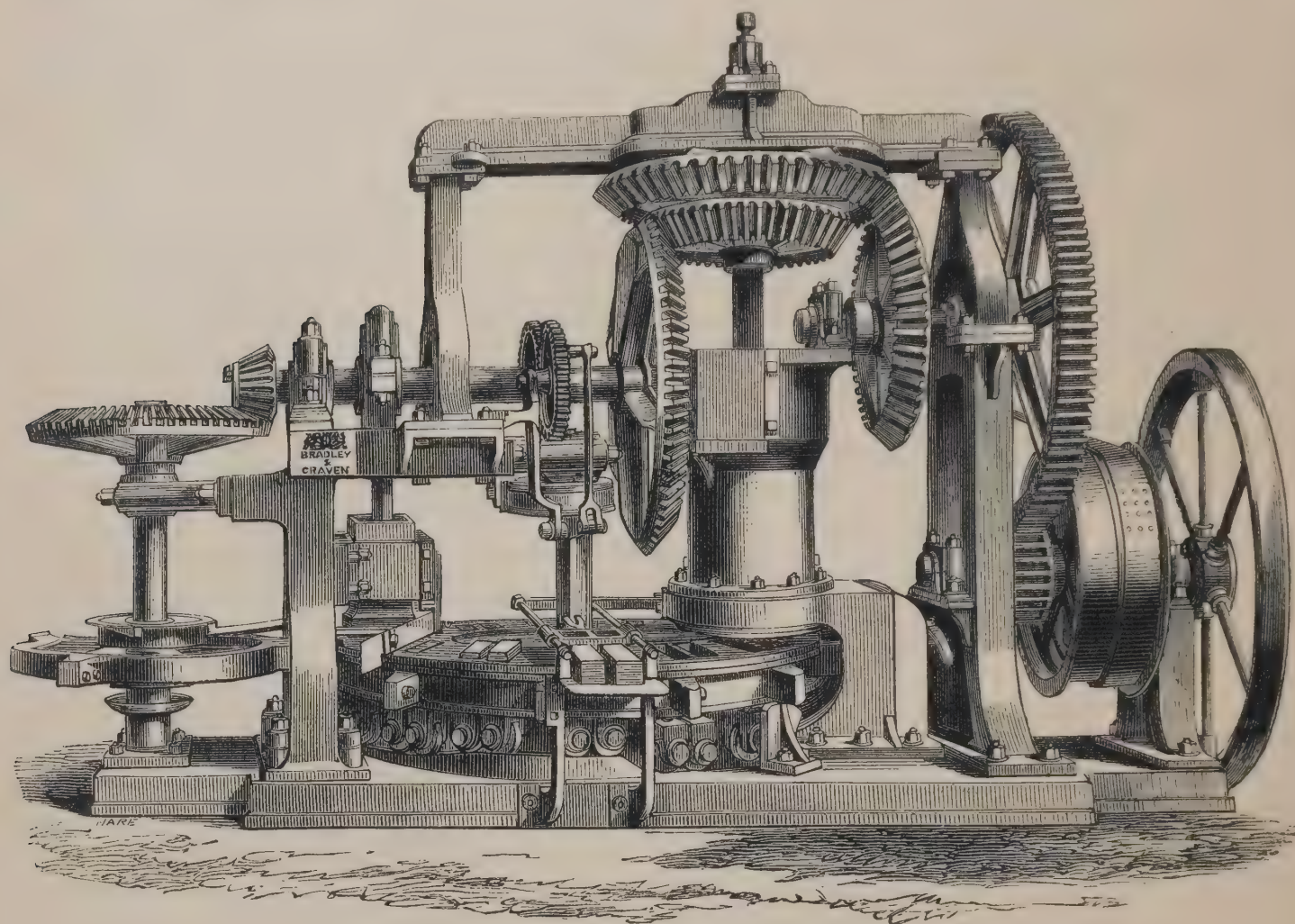
[1569]

CLARKE, T. A. W., *Leicester*.—Machine for covering elastic rings or threads by a new method.

[1570]

CLAYTON, HENRY, & CO., *Atlas Works, near Dorset Square, London, N.W.*—Patent brick, tile, and pipe machines. (See page 39.)

BRADLEY & CRAVEN, MESSRS., *Westgate Common Foundry, Wakefield.*—Patent plastic clay brick-making machine.



PATENT BRICK MOULDING AND PRESSING MACHINE.

The ground allotted to this firm by the Commissioners not being sufficient for the display of their dry clay and other powerful brick-making machines, the above engraving represents the only one their space will allow them to exhibit.

Any material capable of being manufactured into bricks, can be delivered to this machine in the state of dryness it leaves the earth, which, without the addition of any water, produces a superior pressed brick (with many clays), ready for immediate delivery to the kilns for burning. This is the case with several machines working the gault clay in Kent, which comes from the earth so dry, that when made by the machine, the bricks are immediately wheeled into the kilns. The clay on being dug from the earth is delivered to the machine, which grinds and works it into a close, dense, well amalgamated mass, and fills it into the moulds with great solidity.

The action of the machine is as follows:—One pair of the moulds (of which there are twelve in the face of the rotating table) receives the charge of clay at a time from the mill. During the moment that this operation is going on the table is stationary, and two other moulds that have been previously filled are being subjected to considerable pressure by pistons on the opposite side of the table to the mill, and two finished bricks that have been discharged by an inclined plane from the moulds, are delivered on to a creeper band by the action of the machine for removal to the kilns or sheds, perfect-pressed face bricks. Thus the only labour required is to supply the crude, fresh-dug clay to the mill, when the machine prepares, manufactures, and also delivers the bricks to the kiln men for burning.

This machine makes from 15,000 to 20,000 per day. Three of them are working at this rate for the Aylesford

Pottery Company, near Maidstone; and others in this neighbourhood, as well as in different parts of the country, are giving general satisfaction. To save any risk or disappointment to purchasers, the patentees invite manufacturers to test their own clays in the machines previous to incurring any outlay; and they will give every facility for doing so, the only charge being for carriage or freight of clay, when prepayment has not been made. The importance of such trials will be appreciated by practical men. This machine is on the same principle as their well-known dry clay machine, but is not so large nor so powerful.

The result of extensive practical experience, gained in working these machines in all kinds of earth, fully proves the great superiority of forming the clay in moulds, over forcing it through dies, and cutting it with a wire. The advantage lies in the greater truth in the form of the bricks, and also in making them without any water. A still more important advantage is, that the manufacturer is enabled to work any kind of clay, from sandy brick-earth, to the strongest clays mixed with breeze or ashes and sand, to reduce it, neither of which could be worked satisfactorily with a die or cut smooth with a wire. Furthermore, it enables the manufacture to be carried on through all seasons of the year.

Price of machine subject to 1s. per 1,000	
royalty	£250 0
Price of machine free from royalty, for	
export	500 0

Illustrated catalogues of dry clay and other machines for the manufacture of bricks and tiles, with references to those at work, may be had upon application.

CLAYTON, HENRY, & Co., *Atlas Works, near Dorset Square, London, N.W.*—Patent brick, tile, and pipe machines.

These are the champion prize machines of the Royal Agricultural Societies of England, Scotland, Ireland, France, Sardinia, Holland, Austria, Belgium, Hanover, &c.

They have obtained the—

First-class prize at the Great Exhibition of all Nations, London, 1851.

Gold medal of honour at the Universal Exposition, Paris, 1855.

Prize medal and diploma at the Great Exhibition, Amsterdam, 1853.

Gold medal prize at the Royal Exposition, Vienna, 1857.

First-class prize of the Royal Polytechnic Society, 1860.

HENRY CLAYTON & Co., inventors, patentees, and manufacturers of the UNIVERSAL BRICK-MAKING MACHINES, TILE-MAKING MACHINES, PRESSES, &c. have been patronized by H.R.H. (the late) Prince Consort, H.I.H. the Emperor of Russia, H.M. the Queen of Spain, H.I.H. the Emperor of France, H.M. the King of the Belgians, H.M. the King of Hanover, H.I.M. the Empress of Russia, and by Her Majesty's Government for home and colonial use, &c.

BRICK MACHINES of several sizes and of varied construction, according to the nature of the clay, adapted to the manufacture of solid, tubular, or perforated bricks, of any size or form to order, arranged for working either by steam, water, animal, or hand power.

DRAIN PIPE AND TILE MACHINES of various sizes and construction for the manufacture of agricultural drain pipes, sanitary tubes, roofing and paving tiles, and hollow goods of every description.

PRESSES for bricks and tiles, plain or ornamental.

CLAY MILLS, for washing, crushing, pugging, and screening.

MORTAR, LOAM, AND PEAT MILLS.

STEAM ENGINES, portable or stationary, of all sizes.

Detailed plans for an improved construction of kilns, drying rooms, and sheds.

Every description of sawing and constructive machinery for contractors' use, and machinery, tools, and utensils of every kind required in the brick, tile, or pottery manufacture.

The following are selected from a number of favourable notices of these machines:—

“They unquestionably bear evidence of great mechanical ingenuity, and are the most efficient apparatus yet before the public.”—*Engineer.*

“Clayton's machines are simple, and judiciously arranged, combining rapidity of production and economy of manufacture.”—*Practical Mechanic's Journal.*

“The problem solved.”—*Artizan.*

“What the saw mill is to the timber, in our opinion, is Clayton's machine in the manufacture of bricks.”—*Mining Journal.*

“In this machinery Mr. Clayton has proved his thorough knowledge of the mechanical means required, and of the material he has to deal with.”—*Mechanic's Magazine.*

“Cheap and good bricks are now made by these machines;—a subject of national and universal importance.”—*Builder.*

Machines may be inspected and clays tested at the manufactory. Descriptive catalogues sent free by post.

[1571]

COHEN, B. S., 9 *Magdalen Row, Great Russell Street.*—Pencil manufacturing.

[1572]

COLLEY, EDWARD E., 5 *West Cottages, West Street, Walworth.*—Working model of Hoe's printing machine.

[1573]

COLLIER, LUKE, *River Street, Rochdale.*—Confectioners' and biscuit bakers' machines; sugar mills, &c.

[1574]

CONISBEE, WILLIAM, 39 and 40 *Herbert's Buildings, Waterloo Road.*—A Main's patent printing machine, for bookwork and job printing. (*See page 41.*)

[1575]

COOK, D., & Co., *Glasgow.*—Patent steam riveting machine; hour pan, for evaporating sugar-cane juice. (*See page 40.*)

COOK, D., & Co., *Glasgow*.—Patent steam riveting machine; bour pan, for evaporating sugar-cane juice.

COOK'S PATENT STEAM PUNCHING, SHEARING, AND RIVETING MACHINE effects the three operations in one frame, or, when desired, it is made for riveting only.

It can punch thirty holes per minute in ordinary boiler plates. The action of the punch being instantaneous, and every stroke under the control of the keeper, insures both accuracy and speed. In riveting, ten holes can be closed up in one minute, and the work much superior to that effected by hand. Steam pressure required, 25 lbs. per square inch. Prices, designs, and testimonials to be had on application.

BOUR'S PATENT EVAPORATING PAN for the concentration of all liquids.

Having become the proprietors of the patent for this pan, D. Cook & Co. have introduced a considerable

number of them into the various sugar-growing countries, and from the superior mode of construction which they have adopted, can recommend them with every confidence.

This pan consists of ten hollow discs of copper, about 3 ft. diameter, mounted on an axis 10 ft. long, and of a form which allows the exhaust steam, under a pressure of 2 lbs. per square inch, to communicate freely with all the discs, and, at the same time, carrying off the water of condensation at the other end. This revolver turns at a speed of twenty revolutions per minute, in a semi-cylindrical pan of copper, supplied with liquor from the battery, and will cook 12 cwt. of sugar per hour, from 20° Beaume, the temperature not exceeding 170° Fahrenheit.

Prices, designs, &c. may be had on application.

[1576]

COOKE, S., & SONS, *York*.—Amateurs' turning lathes and tools; circle-dividing and wheel-cutting engines.

[1577]

CORYTON, JOHN, 89 *Chancery Lane*.—Patent type-composer.

[1578]

COWAN, THOMAS WILLIAM, *Kent Iron Works, Greenwich*.—Patent air compressed machine-hammer for general forging. (*See page 42.*)

[1579]

COX & SON, 28 and 29 *Southampton Street, Strand, and Belvidere Road, Lambeth*.—Wood carving machine.

[1580]

CRAIG & SONS, 62 *Argyle Street, and 68, Glassford Street, Glasgow*.—Perforating machine; numbering or paging machine.

[1581]

CRAWHALL & CAMPBELL, *Glasgow*.—Horizontal boring machine, with adjustable bar, self-acting, and slide tables.

The exhibitors are manufacturers of machines and tools of every description for mechanical engineers. They exhibit a SELF-ACTING HORIZONTAL BORING MACHINE, having the boring bar adjustable in height

by self-acting motion; with a bracket for supporting the end of the bar when necessary, and a strong bed with adjustable slide tables for carrying the work to be operated upon.

[1582]

DAY & SON, *Gate Street, Lincoln's Inn Fields*.—Lithographic and copper-plate presses.

[1583]

DEANE & DAVIES, 19 *Blackfriars Street, Manchester*.—Sewing machines, presses, gas apparatus, hand stamps.

[1584]

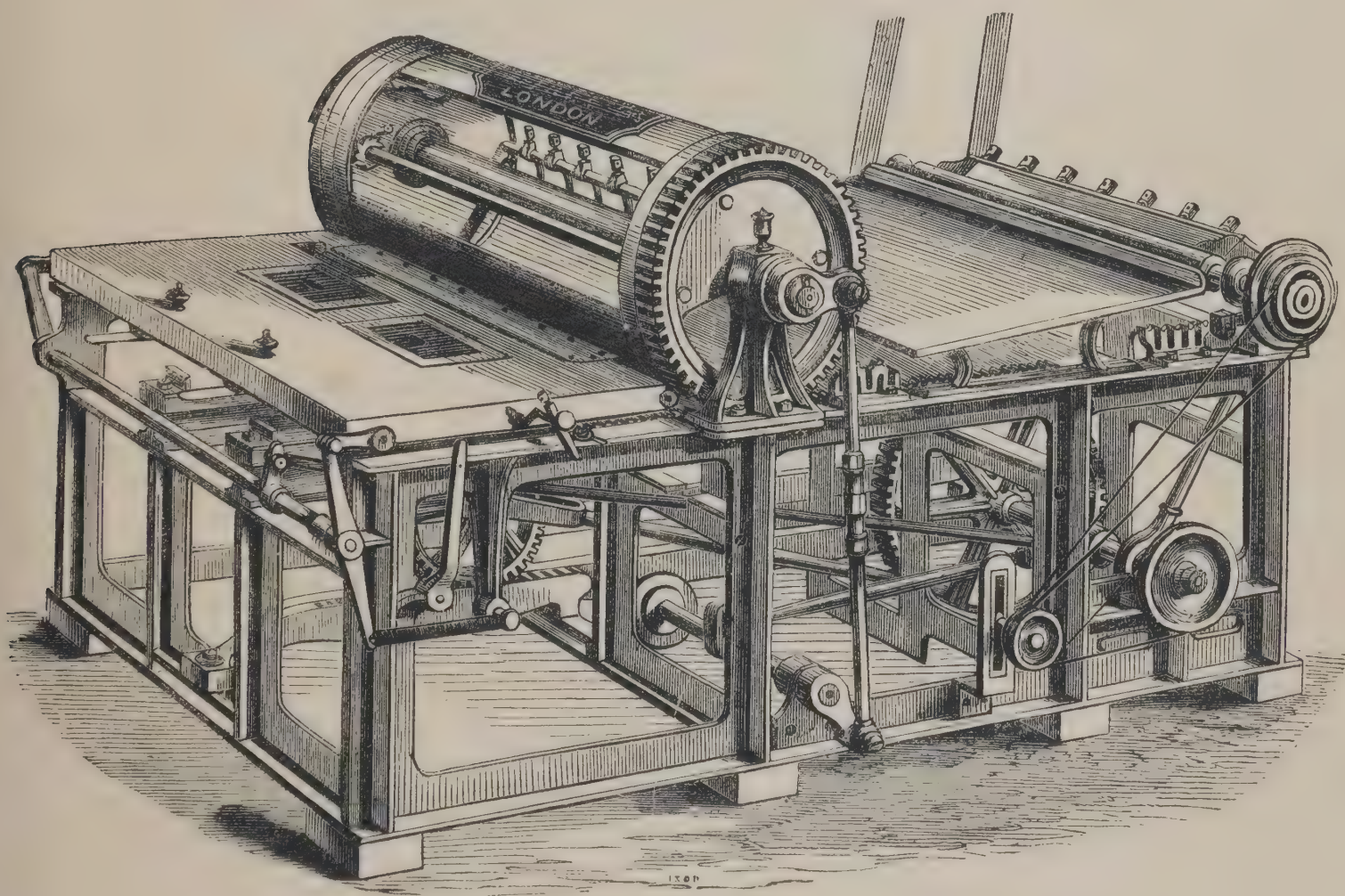
DE BERGUE, CHARLES, & Co., *Manchester, and 9 Dowgate Hill, London*.—Punching, shearing, riveting, and rivet-making machines, and steam hammers.

CONISBEE, WILLIAM, 39 and 40 *Herbert's Buildings, Waterloo Road*.—A Main's patent printing machine, for bookwork and job printing.

This well-known machine is simple in principle, substantial in construction, and economical in working. It will be observed in the accompanying illustration that the table is connected to the cylinder by direct gearing, thus causing them to move always in unison, producing a perfect impression; the gearing being cut by steam machinery, the arrangements for rapid feeding have

been found superior to any other; each sheet being laid to elevating and depressing marks placed at the front of the feed table, giving facilities for certain and rapid feeding, and obviating to a great extent the use of the pointing arrangements which are provided for best register work.

The arrangement for inking will be found equal to the



MAIN'S PATENT PRINTING MACHINE.

most expensive machine, and the whole mechanism is well and carefully made of the best material, by the best London workmen.

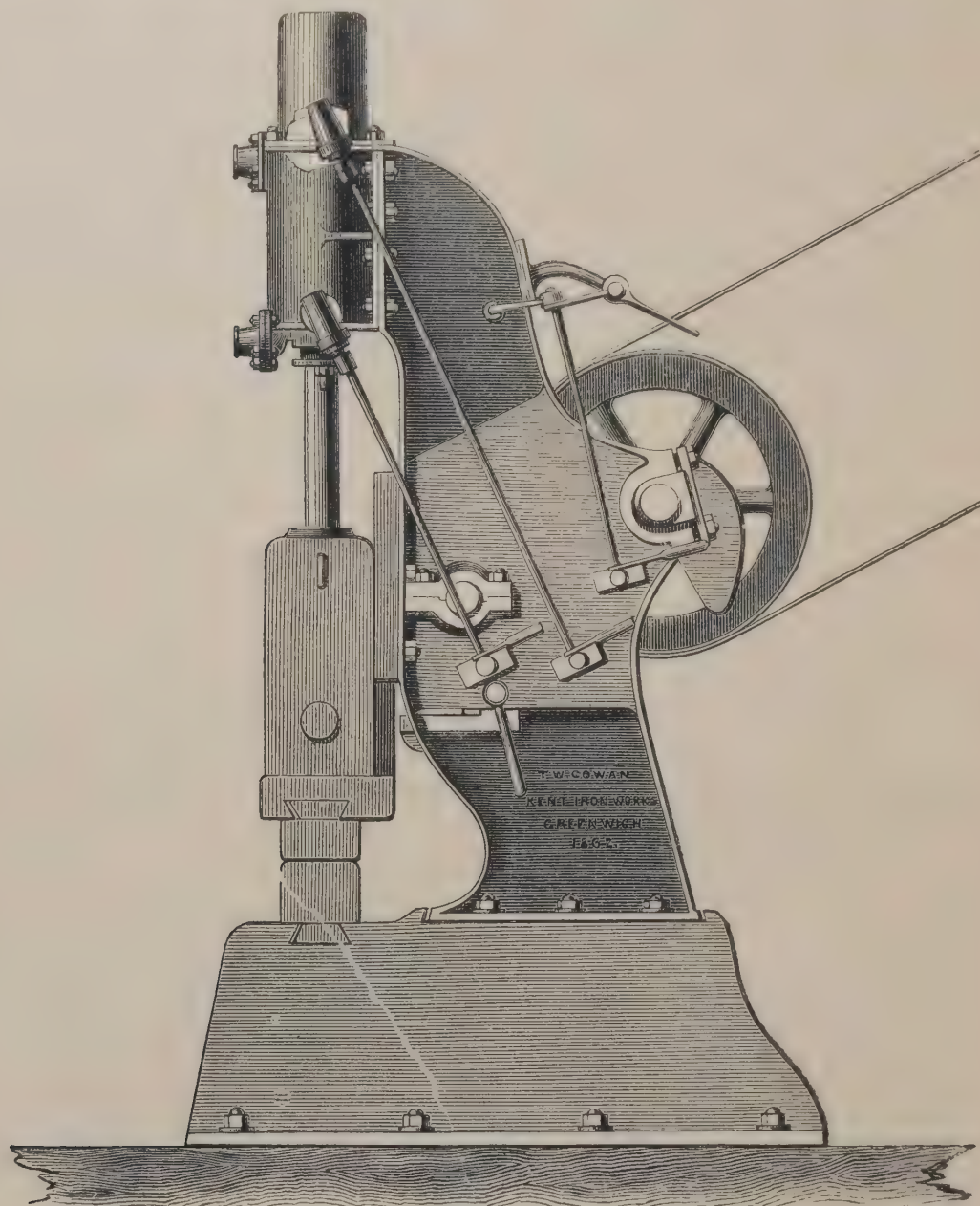
The "Main's" machine is manufactured solely by the proprietor at the Atlas Works, Herbert's Buildings, Southwark, S.; and sold by him, and by the sole agents, Harrild & Sons, Farringdon Street, London, E.C.

Sizes and prices:—

Fast jobbing, to print 19 by 14 in. with fly wheel	£70
Demy, to print 22 by 17 in. with fly wheel	100
Double crown, 30 by 22 in. ditto	130
Double demy, 36 by 23 in.	150
Double royal, 40 by 28 in.	180
Newspaper size, 50 by 38 in.	220

Fly wheel for hand power, £12 for double demy, and £14 for the other sizes.

COWAN, THOMAS WILLIAM, *Kent Iron Works, Greenwich.*—Patent air compressed machine-hammer for general forging.



PATENT AIR COMPRESSED HAMMER.

The engraving represents an AIR HAMMER of 8 cwt. without compression. These hammers can be regulated to the utmost nicety for giving a blow equal in weight to the fraction of an ounce, and increasing it to about 45 cwt. The following is a description of the way this is effected:—

In the first place the motion to the hammer is transmitted by the strap and cam through a lever, which is raised every revolution of the cam. For a very light blow the cock at the bottom, which is usually open, is at this moment shut, causing the air to be compressed at the bottom of the cylinder, at the downward stroke of the hammer; this blow can be regulated by partially opening the cock. When a blow is required equal to the weight of the hammer itself, all the cocks are open. When a heavier blow is required the air is compressed by regulating the upper cock, which communicates with several chambers.

These hammers are recommended for general smiths' work, as they are very easily managed by any boy. The hammer block can be suspended at any part of the stroke, and the speed may be regulated the same as steam hammers.

Small hammers in sets of twos and fours driven from one shaft, and having conical speed pulleys, are very useful where rapidity of workmanship is required, as they are capable of giving about 360 blows per minute.

Trunk hammers are made on this principle for drawing out steel, &c.; also movable cylinder hammers for the same purpose.

All these hammers have very heavy anvil blocks, and the main frame being fixed on these blocks it is impossible for them to sink in the ground without the whole machine going together; hence there is no danger of breaking any of the parts.

None of these hammers require massive foundations.

There is no expense in having to keep up a boiler with high-pressure steam for these hammers, as they are driven by a strap from the usual main shafting, and there is very little foundation required. They are perfectly under the control of the hammer-man, and very soon pay for themselves. Price, from £65 upwards.

WINTON & COWAN'S PATENT HIGH AND LOW PRESSURE DOUBLE CYLINDER HAMMERS are recommended for large forgings. These hammers are made to any size required, the smaller ones having single frames, as the drawing above, and the larger ones, for iron manufactories, double frames, they being best adapted for manufacturing iron and steel.

These hammers effect a great saving in steam, as the steam which is used in raising the hammer, after it has done its work in the small cylinder, is allowed to enter the large cylinder, and give the blow. Price, from £100 upwards.

[1585]

DONKIN, B., & Co., *Near Grange Road, Bermondsey*.—Paper-making machine and paper-cutting machine. (See page 47.)

[1586]

DOULTON & Co., *Lambeth Pottery, S.*—Potter's wheel worked by steam, showing the process of manufacture.

[1587]

DUPPA, T. D., *Longville, Westanstow, Shropshire*.—Vice bench, for carpenters, coopers, &c.

[1588]

EASSIE, WILLIAM, & SONS, *Gloucester*.—A machine for manufacturing round mouldings in wood.

[1589]

EASTERBROOK & ALLCARD, *Sheffield*.—Engineering and railway tools, machines, tacks, crabs, ratchet-braces, spanners, screwing tackle, &c.

Taps, diameter in inches	$\frac{1}{8}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	
Working taps each	1/7	1/7	1/7	2/0	2/0	2/5	2/10	3/8	3/3	4/0	4/10	
Master taps, each	2/5	2/5	2/5	2/10	3/3	3/7	4/0	4/5	4/10	5/7	6/10	
Machine taps each			2/0	2/5	2/5	3/0	3/3	3/7	4/5	5/3	6/5	

Taps, diameter in inches	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
Working taps each	5/7	6/5	7/7	8/10	10/5	12/0	13/7	16/0	18/6	23/3	28/10	35/3	42/5
Master taps each	8/0	9/7	11/3	12/10	14/5	16/9	19/3	21/7	24/0	28/10	35/3	41/7	49/7
Machine taps each	7/7	8/5	10/0	11/7	14/0	17/7	20/0	24/0	27/3	34/5	43/3	53/0	62/6

Whitworth's pattern screw stock, with dies and taps, taper, second, plug, and master, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$, complete with tap wrenches and screw tools in polished case. Price £6 0 0

E. & A.'s registered 3-die screw stock, with dies and taps, taper and plug, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, $\frac{5}{8}$, and tap wrenches, in polished case £3 16 0

Screw stock No. 153, with dies and taps, $1\frac{1}{4}$, $1\frac{3}{8}$, $1\frac{1}{2}$. Price £5 12 0

Iron gas stock taps and dies, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ 2 0 0

Easterbrook & Allcard's patent universal ratchet brace. No. 1304, 12 in. 18/0; 16 in. 21/0; 20 in. 24/0.

E. & A.'s registered double action, No. 4235, 15 in. 36/0.

Ratchet braces, 012, 14 in. 18/0; 16 in. 19/6; 18 in. 21/0; 20 in. 22/6.

Ratchet braces, 14 in. No. 010, 13/0; 011, 15/0; 013, 30/0; 014, 52/6; 016, 16/0; 017, 19/6; 018, 16/0; 041, 22/6; 042, 36/0; 043, 13/0.

Extra strong black ditto, No. 040, 30 in. 45/0; 20 in. 30/0.

Cast-steel drills to fit the above, assorted $\frac{1}{4}$ to 1 in. 10/0 per dozen.

Spanners, 12 in. No. 020, 8/6; 021, 6/6; 022, 8/0; 024, 9/3; 025, 8/6; 026, 4/9; 027, 4/9; 028, 2/7; 029, 2/7; 030, 4/0; 101, 3/3.

Screw wrenches, 10 in. No. 093, 3/0; 0214, 5/3; 0216, 6/3; 0217, 7/3; 0220, 9/6; 0221, 6/6.

Sash cramps 18 in. 11/0 pair; floor cramps, 18/0 each.

Pulley blocks, 2 and 3 sheaves, $4\frac{1}{2}$ in. dia. 45/0 per pair.

Snatch block to match, 26/0.

Fluted rimers, set of 12 assorted $\frac{3}{8}$ to $1\frac{1}{2}$. . . £3 10 0

Foot lathe, double gear, 6 in. centres, 5 ft. bed, hand-rest, face-plate, and centres complete . . . £25 0 0

Compound slide rest for ditto 6 0 0

Traversing jack, $2\frac{1}{2}$ in. screw 8 16 0

Tripod jack, $2\frac{1}{2}$ in. screw 5 4 0

Bottle jack, wrought-iron case, 8 tons . . . 4 0 0

Ditto, cast-iron case, 3 tons 1 13 0

Haley's jack, 4 tons, £4; 6 tons, £4 16s.; 8 tons 5 12 0

Improved ratchet jack, 9 tons. 5 10 0

E. & A.'s patent wrought-iron parallel vice, 5 in. 1 10 0

E. & A.'s registered adjustable vice, 5*d.* lb.

Portable vice bench, with 5 in. bright vice . 3 0 0

Hammers, chipping, cast-steel, 1/4 lb.

Boiler-makers' hammers, same price as chipping.

Sledge hammers above 8 lb. 4*d.* lb.

Chisels, chipping, CS. 10*d.* lb.

Bench drilling machine, 30 in. £7 0 0

Drilling stoop adjustable, 50/0; No. 053, 32/0.

Scotch iron brace, with 36 bits, 25/0.

Permanent way cramp, 5*d.* lb.

Boiler-punching bear, £5; cramp, 10/0.

Sets of miniature tools, made up from £1 to 40 0 0

[1590]

EASTWOOD, CHARLES, *Virginia Place, Leeds*.—Cutting and measuring machine, for cutting purposes in the brush trade.

[1591]

EASTWOOD, JAMES, & SONS, *Railway Iron Works, Derby*.—Steam hammer, samples of iron.

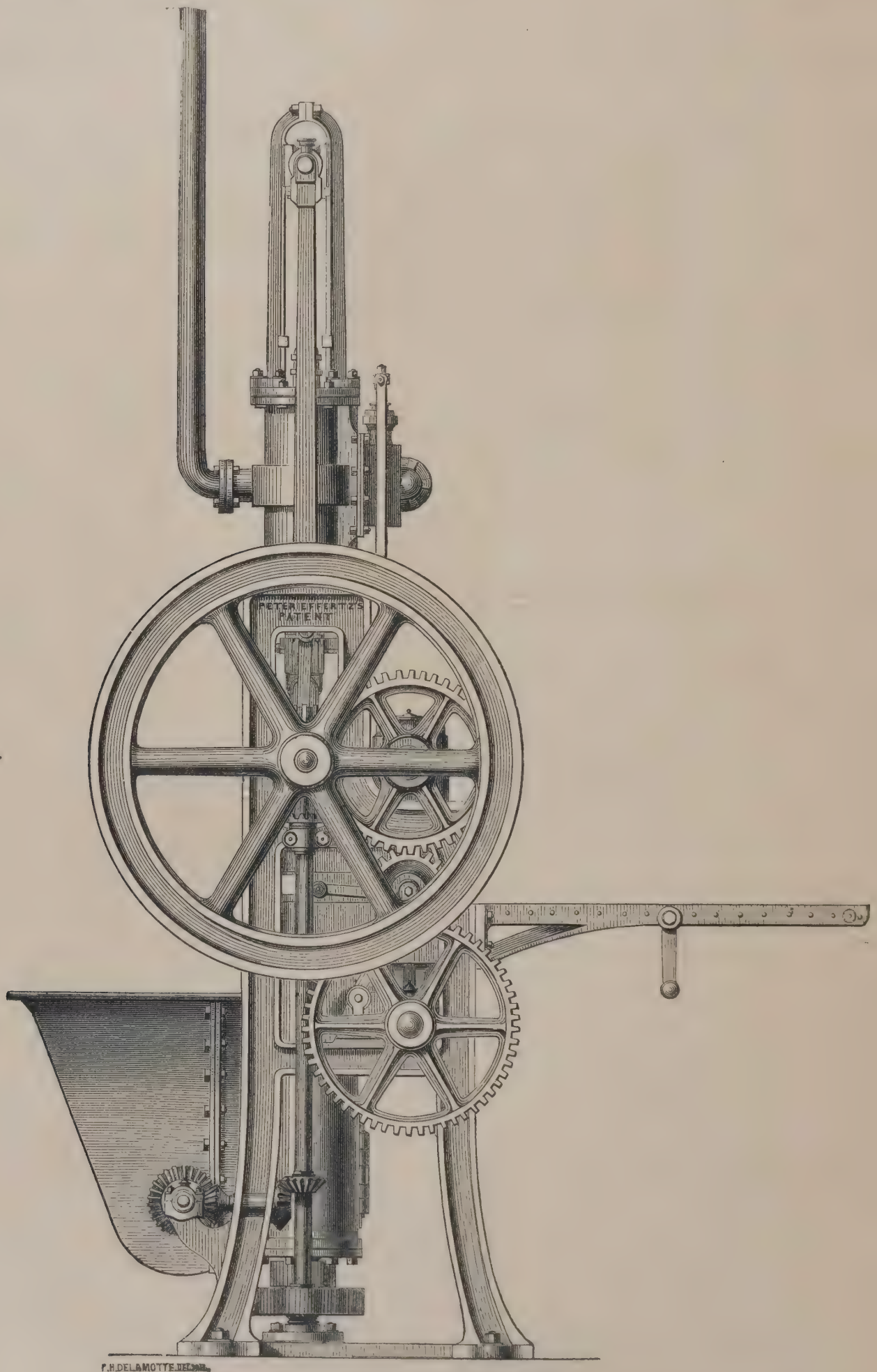
[1592]

EFFERTZ, PETER, 71 *Coupland Street, Manchester*.—Brick machine; drain-pipe machine; model of brick machine; drawings. (See pages 44 to 46.)

[1593]

EVANS, JOHN, & SON, 104 *Wardour Street*.—Amateurs' ornamental turning lathe, tools, and apparatus, and specimens of turning by amateurs.

EFFERTZ, PETER, 71 *Coupland Street, Manchester*.—Brick machine; drain-pipe machine; model of brick machine; drawings.

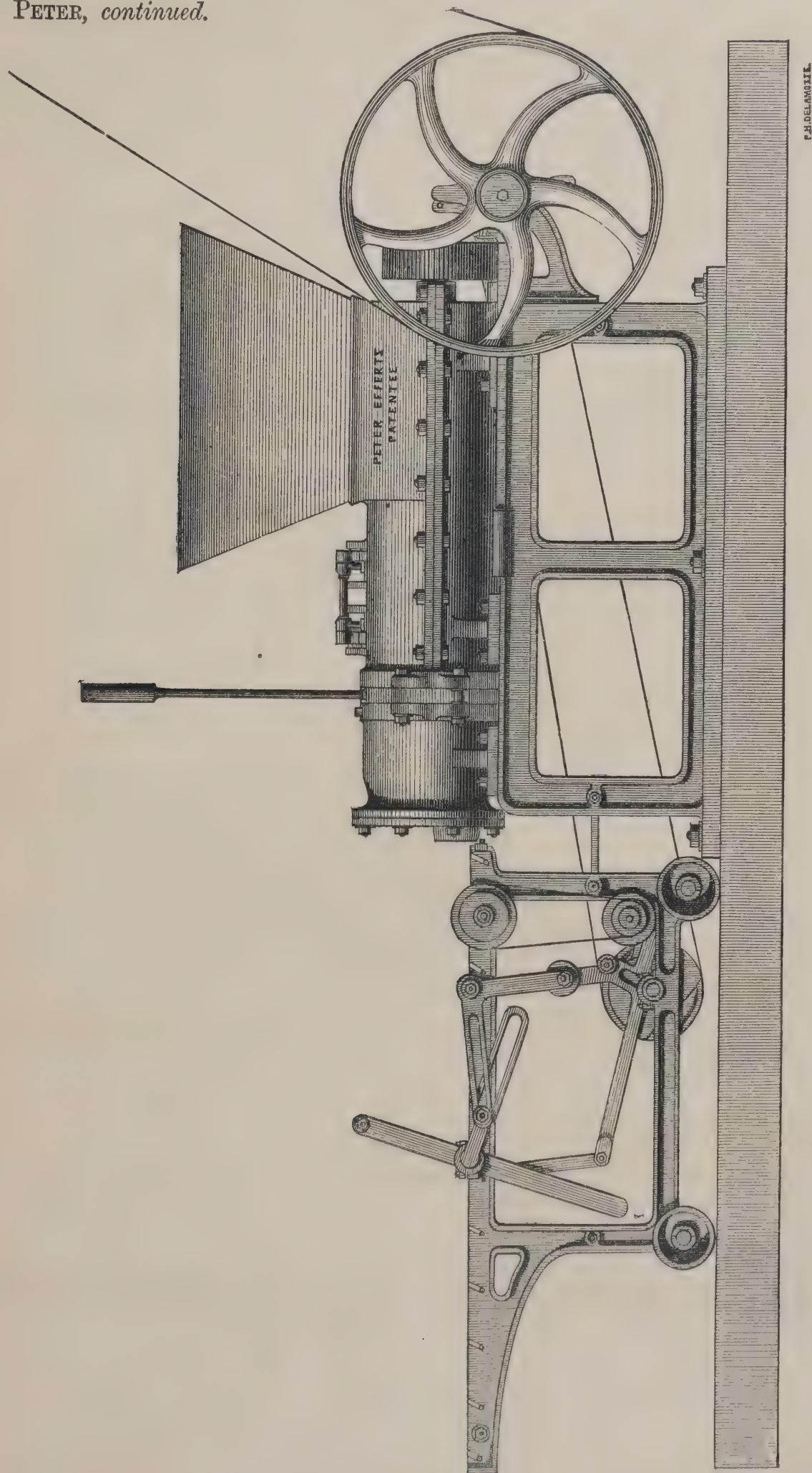


1.—BRICK-MAKING MACHINE.

The model of this BRICK-MAKING MACHINE is an elaborate and ingenious piece of mechanism, well worth the attention of visitors to the Exhibition. It represents a machine calculated to make 75,000 highly finished bricks per day.

It cleans, mixes, and presses the rough clay into moulds the required size of the bricks, which are conveyed from the machine to the drying places or kilns on peculiarly constructed waggons, a model of which is shown with the

EFFERTZ, PETER, *continued.*



2.—PATENT BRICK AND TILE MAKING MACHINE.

model machine. The inventor has provided machines of four different sizes, constructed to produce respectively 25,000, 30,000, 50,000, 75,000 and upwards per diem.

The illustration No. 1 represents a view of the smallest, or No. 1 machine, producing 25,000 bricks per day, a full-sized working machine is in the Exhibition.

EFFERTZ, PETER, *continued.*

The PATENT BRICK AND TILE MAKING MACHINE is shown in illustration No. 2. This machine is constructed to produce common bricks, roofing tiles, drain and floor tiles, and similar articles at any required length and size; it cleans and mixes the clay, and is calculated to produce 30,000 drain tiles per diem, of 2 in. bore, and, according to size or length more or less.

In the Exhibition, besides the above-named models, and full-sized working machine, are highly finished drawings on a large scale, representing several of the brick machines; the waggons used to convey the bricks from the machine to the drying places and kilns; and also the apparatus for carrying the rough clay to the brick machine.

[1594]

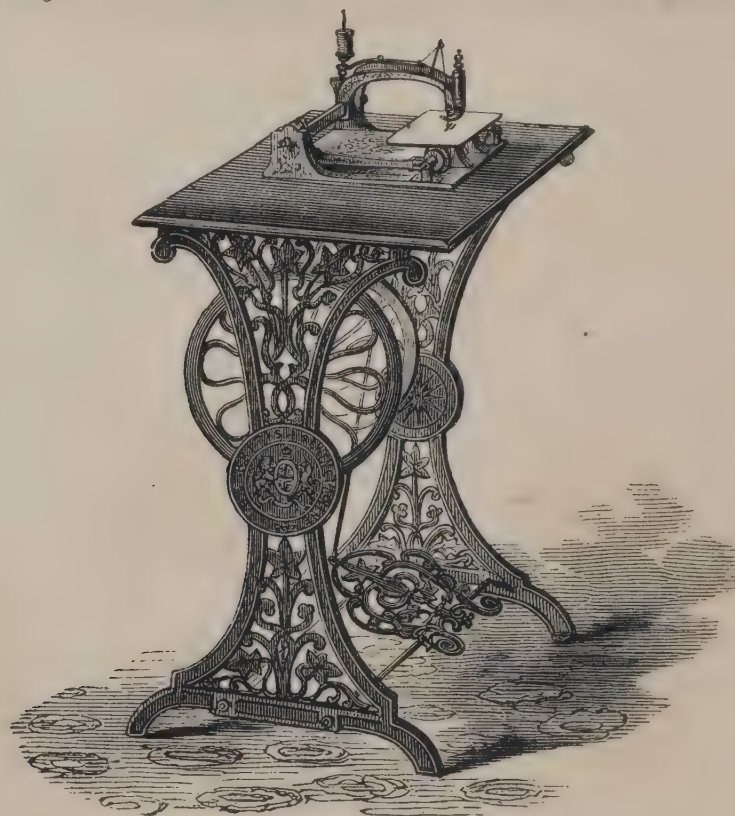
FAIRBAIRN, P., & Co., *Leeds.*—Engineering tools and rope-spinning machinery. (*See pages 48 to 54.*)

[1595]

FENTUM, MARTIN, 85 *New Bond Street*, and 8 *Hemmings Row*, *Leicester Square.*—Lathe and saw for working in ivory.

[1596]

FERRABEE, HENRY, 75 *High Holborn*, *London.*—The British sewing machine.



BRITISH SEWING MACHINE.

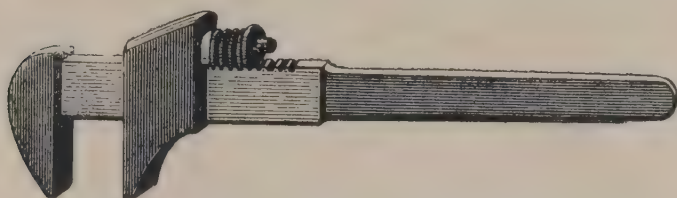
THE BRITISH SEWING MACHINE is specially adapted for family use. It makes a stitch which is exactly alike on both sides of the fabric, and it can execute perfect sewing at the rate of 5,000

stitches per minute. Price of a machine as illustrated and exhibited £10 0

Cabinet machines at various prices.

[1597]

FERRABEE, JAMES, & Co., *Stroud*, *Gloucestershire*, and 75 & 76 *High Holborn*, *London.*—Adjusting spanners or screw wrenches.



FERRABEE'S PATENT WEDGE SPANNER.



FERRABEE'S PROTECTED SPANNER.

[1598]

FORREST & BARR, *Glasgow.*—Wood planing and moulding machine, for ship builders, timber merchants, house and waggon builders. (*See page 56.*)

[1599]

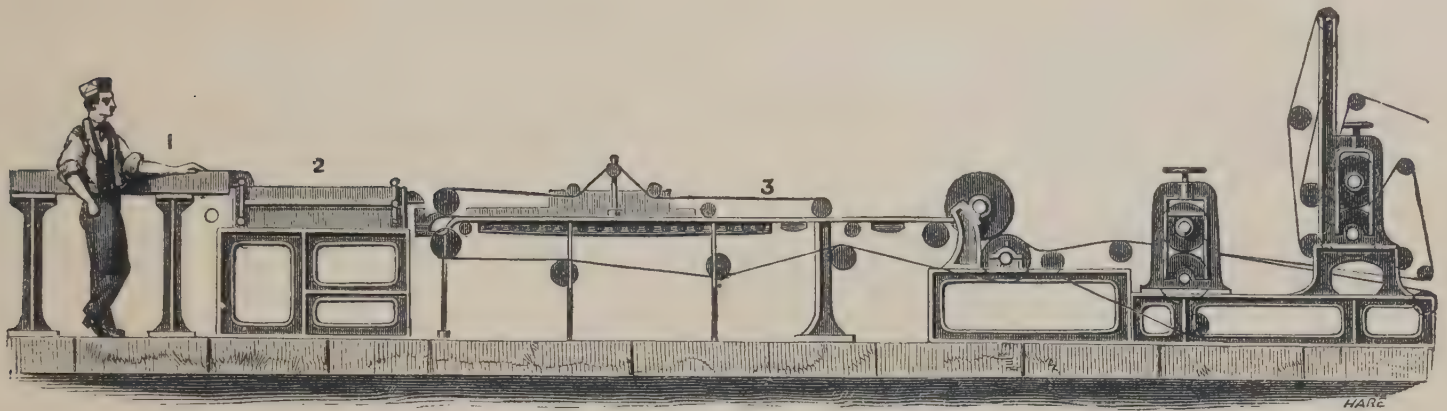
FOX, BROTHERS, *Derby.*—Slide and screw-cutting lathe; vertical drilling machine; planing machine.

[1600]

GADD, WILLIAM, & SON, *Fishergate*, *Nottingham.*—Screwing machine upon a new principle.

DONKIN, B. & Co., *Near Grange Road, Bermondsey.*—Paper-making machine and paper-cutting machine.

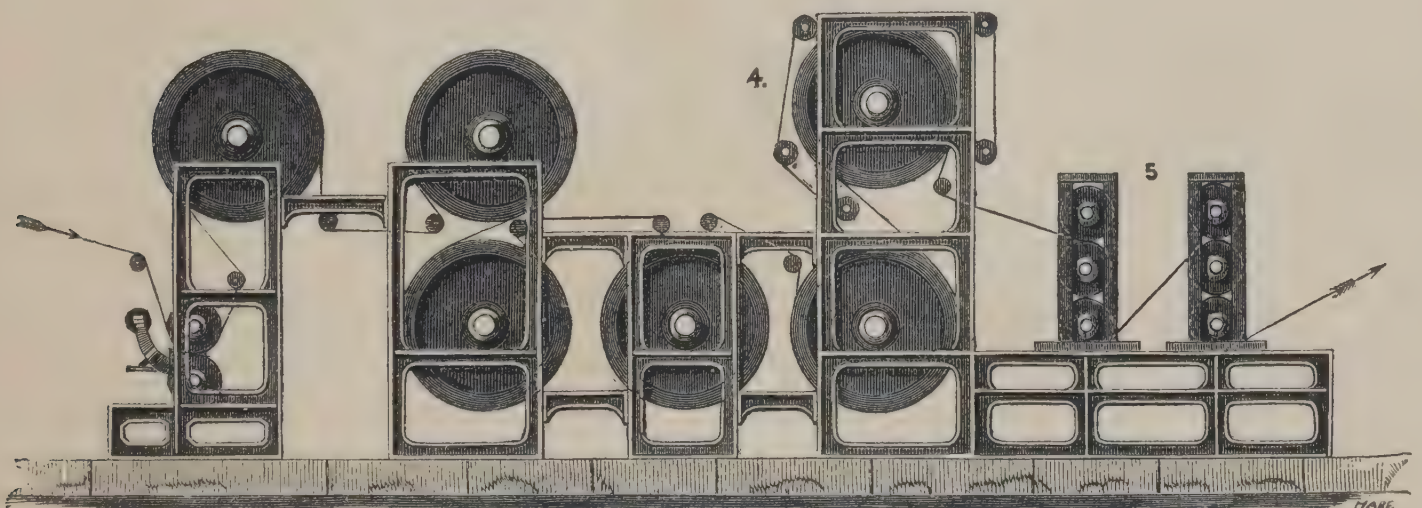
Obtained the Council Medal in Class 6, in London, in 1851.



MACHINE WITH ENDLESS WIRE.

PAPER-MAKING MACHINE on the same principle as those erected by Mr. Donkin, of Bermondsey, at Frogmore, in Berks, in 1803, and at Twowaters, in Hertfordshire, in 1804, which were the first machines

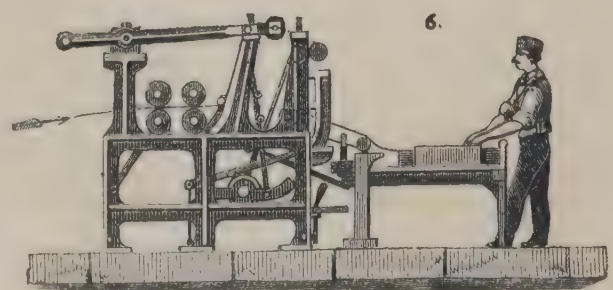
ever used for making endless paper. The machines for clearing the pulp, and for drying and cutting the paper, were subsequent inventions, and admit of great variation in their construction.



DRYING MACHINE.

1. Cast-iron sand catcher, coated with zinc.
2. Knot strainer, with brass plates, a parallel motion being given to this knotter, a uniform action over the whole plate is secured.
3. Machine with endless wire, 7 ft. 6 in. wide, 34 ft. long, with improved deckles, self-acting guide for the wire, and rider roll of perforated copper (Wilkes's patent).
4. Drying machine, consisting of 6 steam cylinders, 4 ft. diameter.
5. Two sets of smoothing presses.
6. Cutting machine of improved construction, for cutting the endless paper into sheets as it leaves the smoothing presses, without the intervention of reels.

Although the machines Nos. 3, 4, and 6, are drawn separately, they form one continuous machine; the pulp

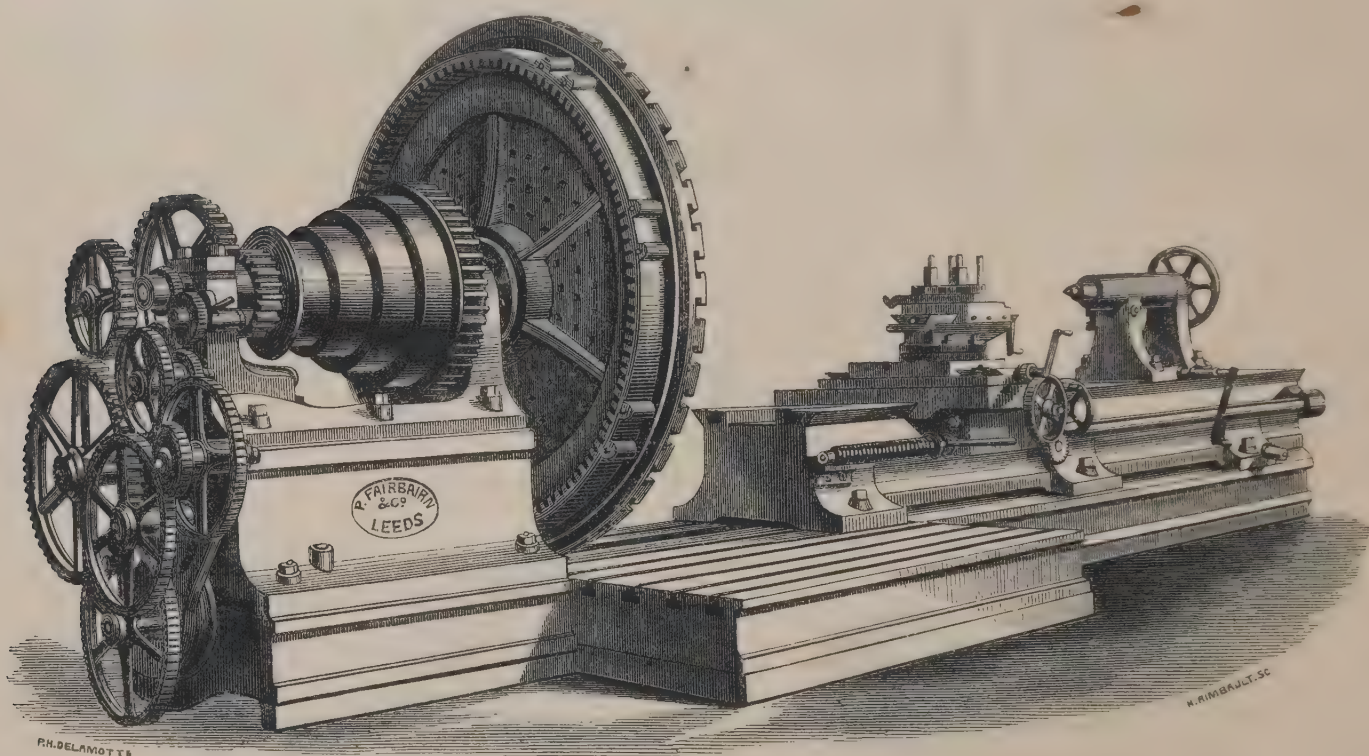


CUTTING MACHINE.

being supplied at one end, and the dry paper being delivered at the other, in sheets of the size required.

A machine of this description would make an endless sheet of paper about 20 miles long in 24 hours, which would cover about 17 acres, if kept continuously at work.

FAIRBAIRN, P., & Co., *Wellington Foundry, Leeds; 36 Great George Street, Westminster, London*, Engineers' tools, including lathes; boring, drilling, slotting, planing and shaping machines; wheel-cutting, screwing, punching and shearing machines; plate-bending, forging and hot-iron machines, wood-cutting machinery, steam and travelling cranes; gauges, surface-plates and hand screwing apparatus. Special machinery for turning, boring and rifling guns and cutting armour plates; machinery for the manufacture of small arms, shells, &c. Machinery for hackling, preparing, spinning and twisting flax, tow, hemp and jute; also Heilmann's combing machine for tow; machine for making hemp and Manilla rope yarns; twine machinery, &c.; filling, dressing, gill preparing, spinning and twisting machines for waste silk, &c.

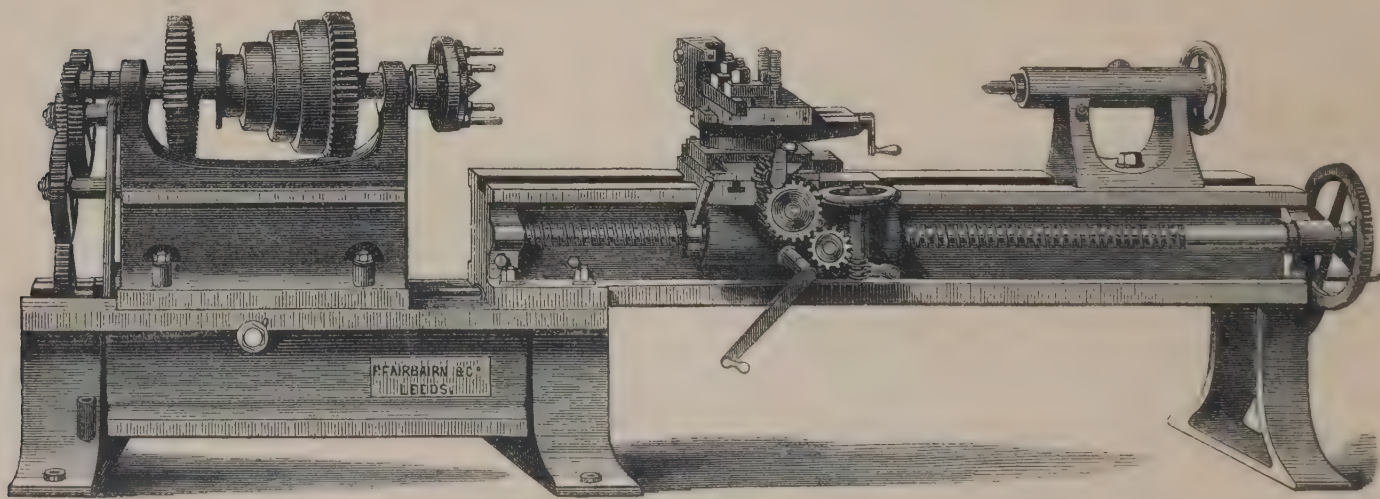


SELF-ACTING BREAK LATHE, 21 in. centres.

SELF-ACTING SLIDE BREAK LATHES, with treble-gear headstocks and large face plate. Strong base plate with sliding bed upon it moved by rack and pinion. Saddle with T-grooves for fixing work when boring, reversing motion for guide screw, self-acting patent

surfacing motion, movable headstock, driving apparatus and screw keys.

These lathes are made with headstocks from 12 to 36 in. centres and upwards, and the diameter of work they will admit in the break from 4 ft. 5 ft. to 11 ft. respectively.



SLIDE AND SCREW CUTTING LATHE WITH MOVABLE GAP, 10 in. centres.

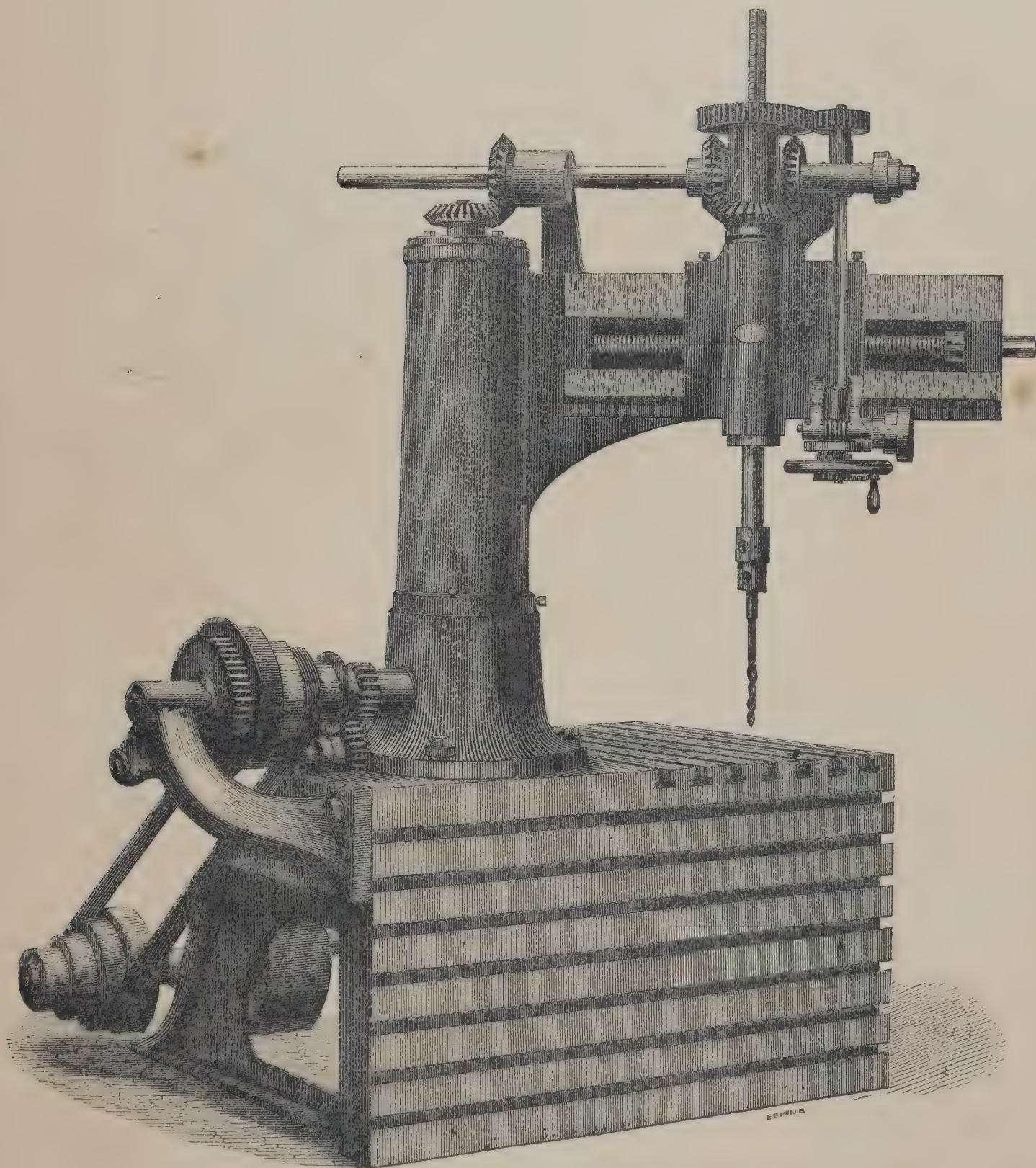
SELF-ACTING SLIDE LATHES, with doubled-gear headstocks, spindles up to 12 in. centres fitted in conical bearings of hardened steel; above that size in parallel bearings of gun-metal. The bed is fitted with guide screw (reversing motion, above 12 in. centres), self-acting patent surfacing motion, loose headstock, driving

apparatus, face plates, Clement's driver, back stay and screw keys.

These lathes are made from 5-in. centres and upwards; screw cutting when required, or with movable gap as shown.

Also foot lathes, hand, surfacing, boring and special lathes, lathes for railway wheels, crank axles, guns, &c.

FAIRBAIRN, P., & Co., *continued.*

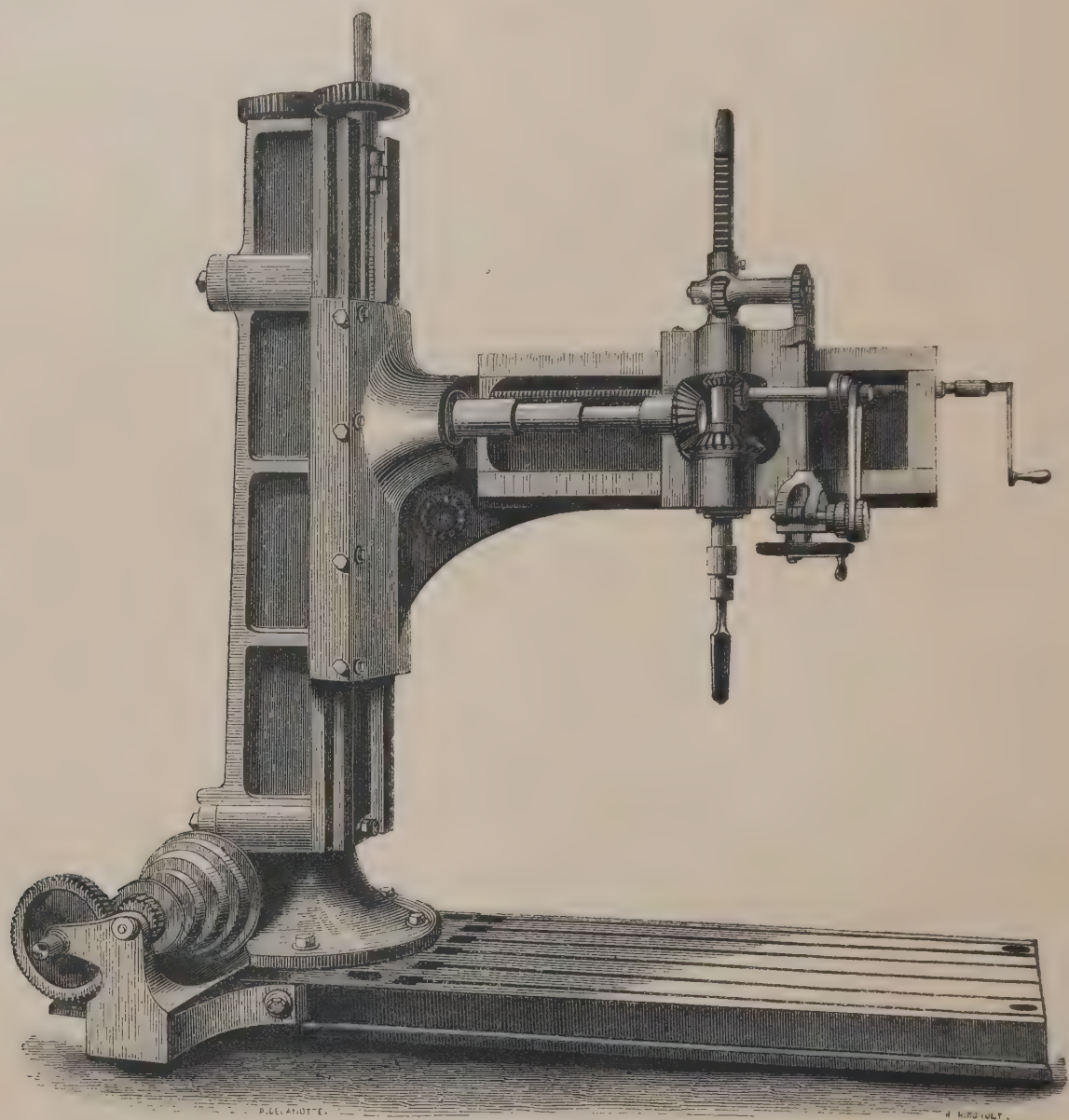


RADIAL DRILLING MACHINE, $1\frac{3}{4}$ in. spindle.

SELF-ACTING DOUBLE-GEARED RADIAL DRILLING AND BORING MACHINE, with the base plate arranged with bolt grooves, so that the work can be fixed to the top or the side as convenient.

Will bore up to 4 in. at a maximum radius of 36 in. The driving apparatus is self-contained, and the machine complete with drill chucks and screw keys. Diameter of steel spindle $1\frac{3}{4}$ in.

FAIRBAIRN, P., & Co., *continued.*

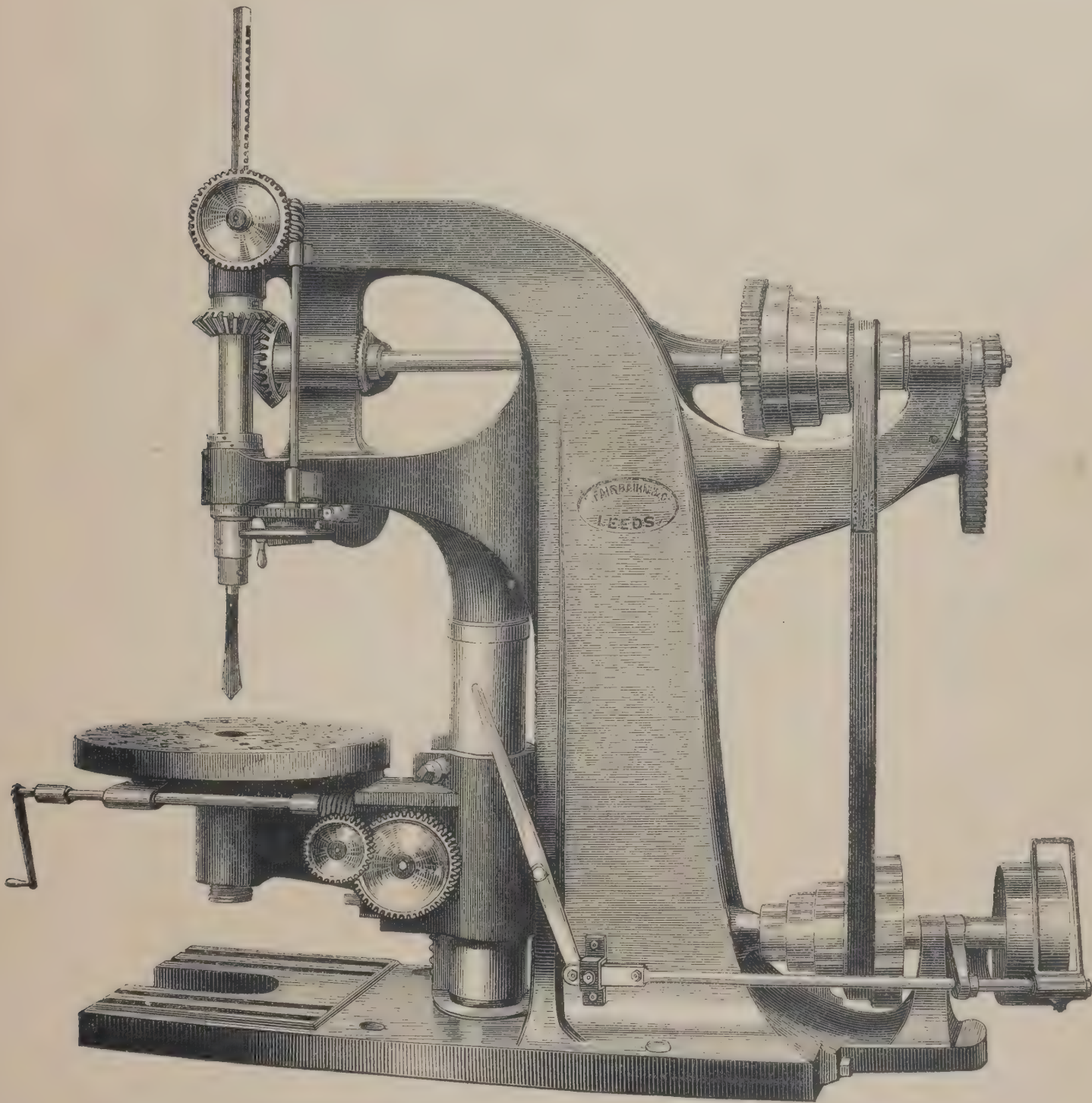


SELF-ACTING RADIAL DRILL, 2½ in. spindle.

SELF-ACTING DOUBLE-GEARED RADIAL DRILLING AND BORING MACHINES, radial arm will revolve 320° and will move vertically up or down by power, at any position; strong base plate with T-grooves for holding the work. Driving apparatus, drill chucks and screw keys.

Diameter of steel spindle.	Will bore up to	Maximum radius.	Maximum height of spindle from base plate.	Feed of spindle.	Radial arm will move up or down.
2½ in.	6 in.	6 ft. 0 in.	6 ft. 0 in.	1 ft. 3 in.	3 ft. 0 in.
3 in.	12 in.	8 ft. 4 in.	7 ft. 6 in.	2 ft. 0 in.	4 ft. 4 in.

FAIRBAIRN, P., & Co., *continued.*

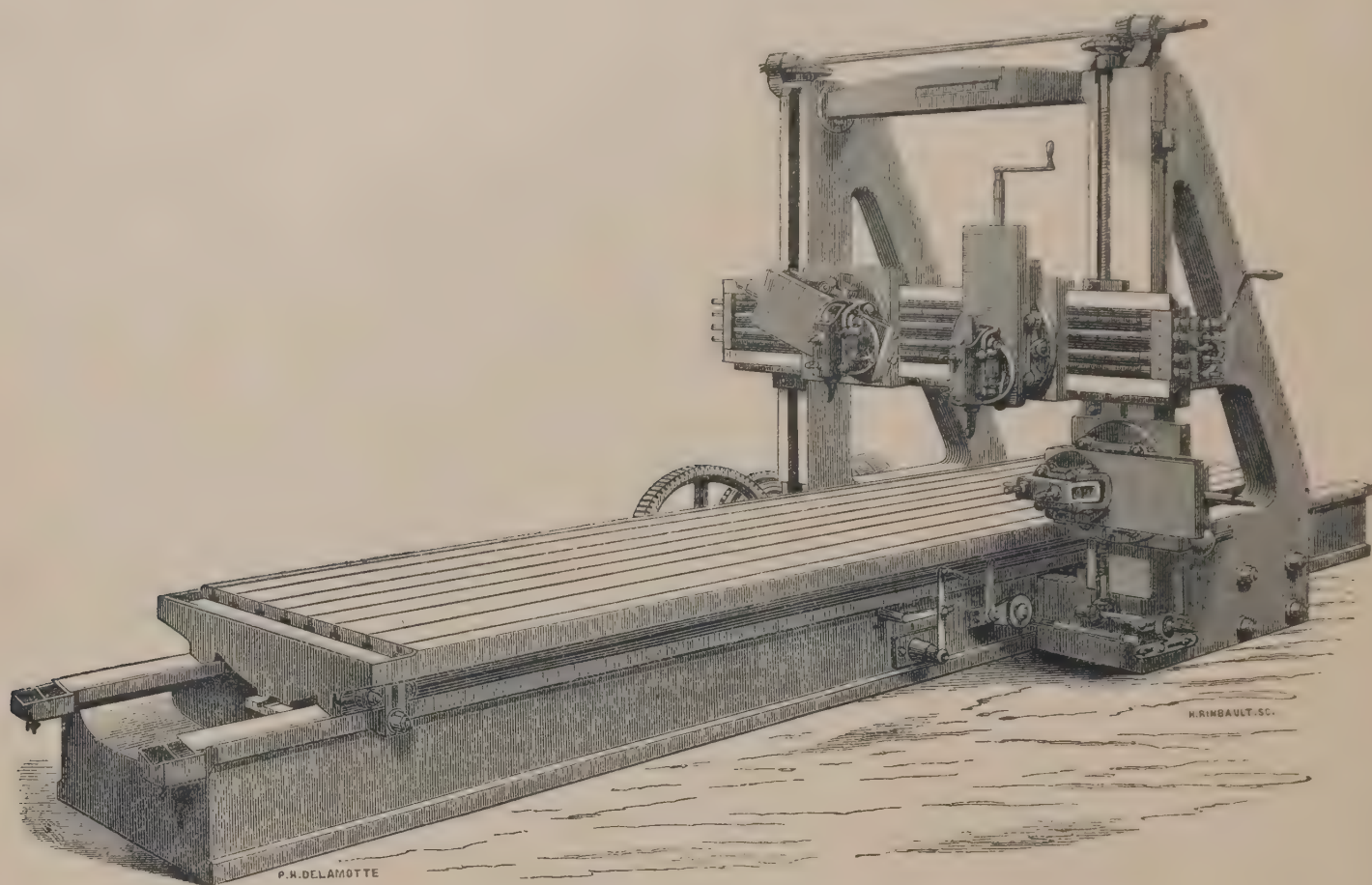


LARGE VERTICAL DRILLING MACHINE, $2\frac{3}{4}$ in. spindle.

SELF-ACTING VERTICAL DOUBLE-GEARED DRILLING AND BORING MACHINES, with the base plate and frame cast in one ; revolving table so arranged on a radial arm as to leave the base plate clear for large work, and movable vertically by rack and pinion. Driving apparatus self-contained. Drill chucks and screw keys.

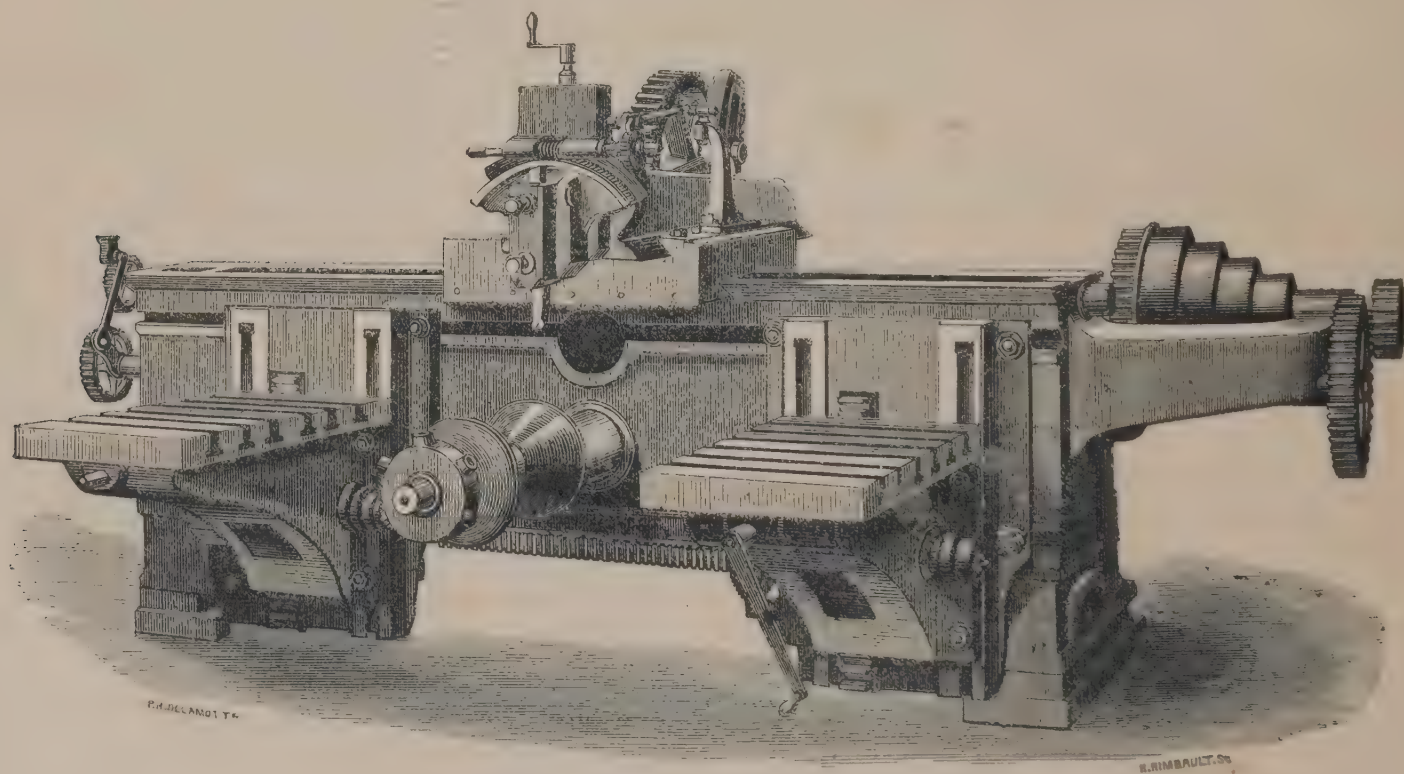
Diameter of steel spindle.	Will bore up to	Will take in diameter.	Feed of spindle.
$1\frac{1}{2}$ in.	$1\frac{1}{2}$ in.	2 ft. 0 in.	7 in.
$1\frac{3}{4}$ in.	4 in.	2 ft. 8 in.	10 in.
$2\frac{1}{4}$ in.	7 in.	3 ft. 10 in.	15 in.
$2\frac{3}{4}$ in.	12 in.	5 ft. 0 in.	24 in.

FAIRBAIRN, P., & Co., *continued.*



SELF-ACTING PLANING MACHINE, to plane work 6 feet square, and 20 feet long.

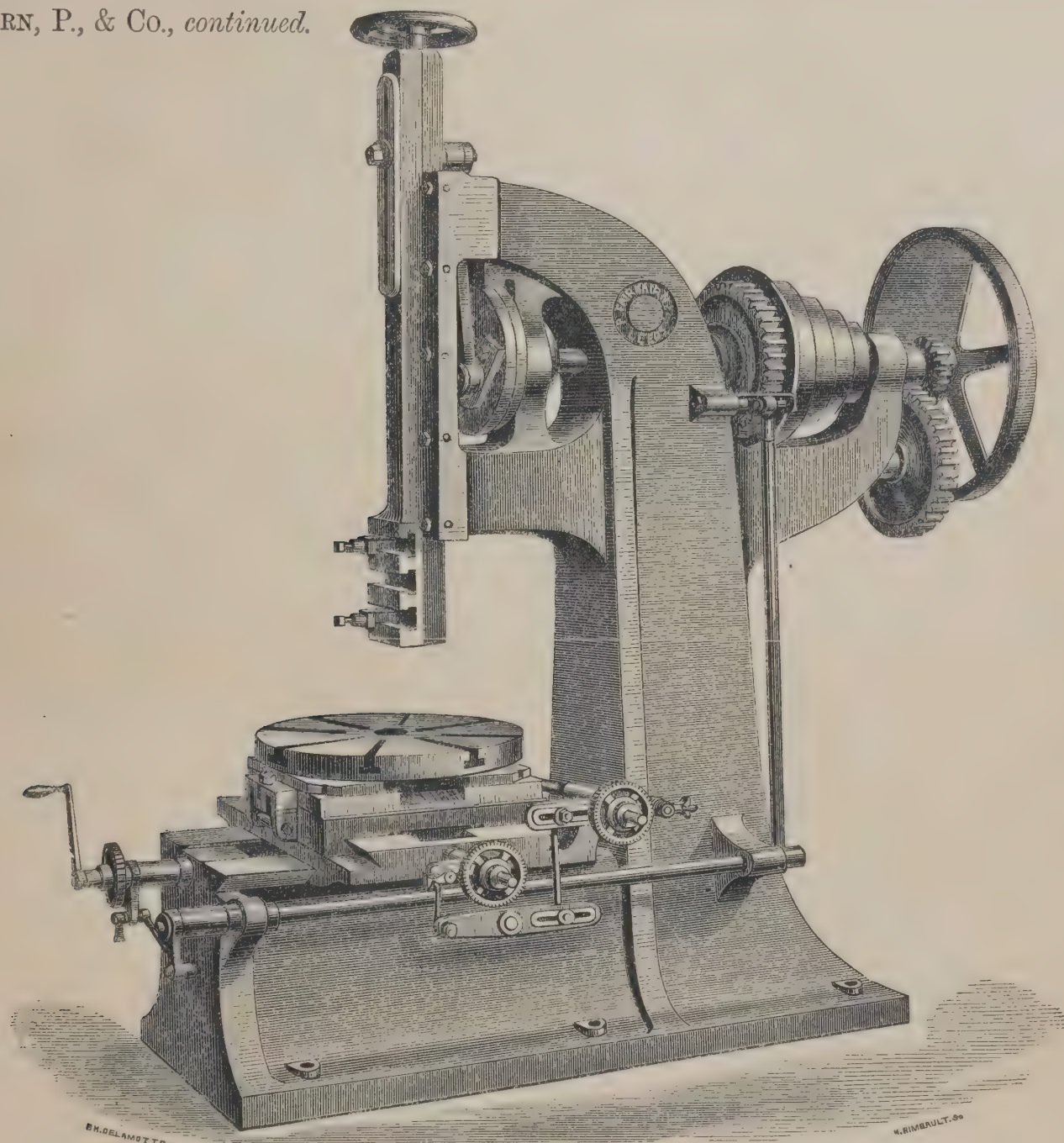
SELF-ACTING PLANING MACHINE, to work either by screw or rack up to 3 ft. square ; above that size, by rack and pinion. These machines are made to plane work from 1 ft. 6 in. square up to 14 ft. square, and to any length with 1 or more tool boxes or side tools as may be desired.



TREBLE-GEARED SHAPING MACHINE, 24 in. stroke.

SHAPING MACHINES, self-acting, in longitudinal, vertical, angular and circular motions, head-stock sliding upon the bed, and with quick return motion to tool, 2 front tables, movable vertically by rack and pinion, driving apparatus, and set of screw keys. These machines are made from 6 in. stroke upwards. Smaller machines are described elsewhere.

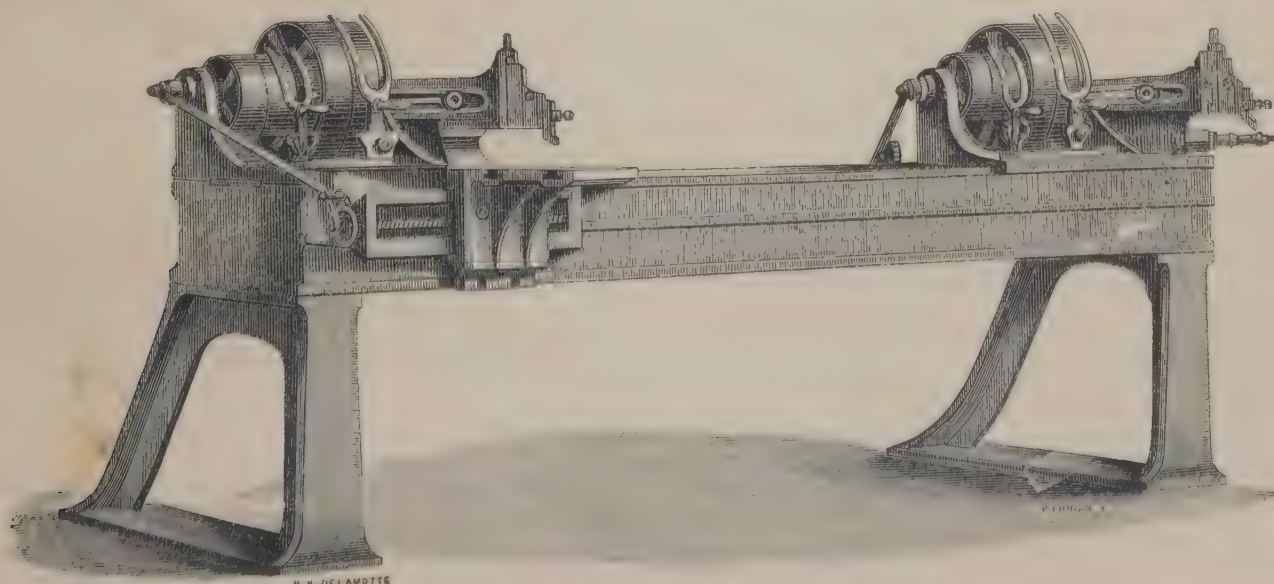
FAIRBAIRN, P., & Co., *continued.*



SLOTING MACHINE, 9 in. stroke.

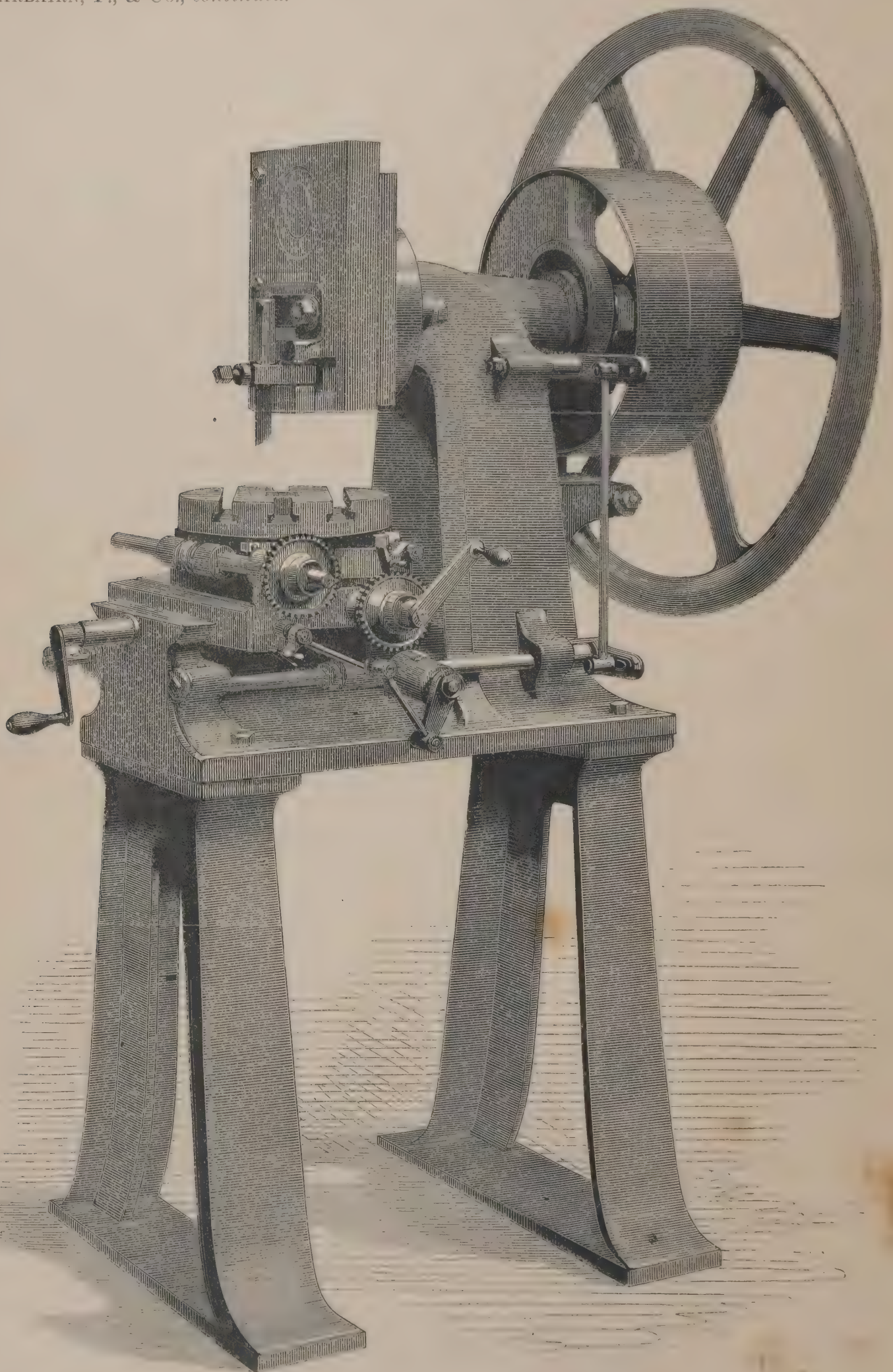
SELF-ACTING SLOTING MACHINES with the upright and bed cast in one up to 20 in. stroke, above that size they are cast separately. Double-gearred up to 20 in. stroke, and arranged for the gear to throw out for short and finishing strokes. Above 20 in. they are treble-gearred; self-acting circular table capable of being inclined for key bed slotting, self-acting compound lower slides. Balanced vertical slide, arranged to hold one or more tools. Driving apparatus and screw keys: Smaller sizes described elsewhere.

Length of stroke.	Will admit in diameter.
6 in.	2 ft. 6 in.
9 in.	3 ft. 7 in.
12 in.	4 ft. 8 in.
16 in.	5 ft. 10 in.
20 in.	7 ft. 0 in.
25 in.	8 ft. 0 in.
30 in.	8 ft. 6 in.



TWO SHAPING MACHINES, $3\frac{1}{2}$ in. stroke upon one bed.

FAIRBAIRN, P., & Co., *continued.*



SELF-ACTING SLOTTING MACHINE, 3 in. stroke.

SMALL SINGLE-SPEED SLOTTING MACHINE, 3-in. stroke, placed upon standards or a fitter's bench, as desired. Capable of slotting flat work, 9 in. in length, and circular work, 9 in. diameter; both self-acting. Balanced slide, fly wheel, belt fork and screw keys.

FAIRBAIRN, P., & Co., *continued.*

SMALL SELF-ACTING SHAPING MACHINES $3\frac{1}{2}$ in. stroke, with fast and loose pulleys for two speeds. Arranged for flat work with self-acting table adjustable vertically, and fitted with vice and screw keys; or for circular work with arbor and cones.

These machines can be had separately, to place upon a

fitter's bench, or one, two, or three can be placed upon a bed, as may be desired.

A larger machine is also made 5 in. stroke on the same principle, but with gear. Nut-shaping apparatus extra.

These machines are very useful for shaping nuts, bolts, keys and a great variety of other work.

[1601]

GARRETT, B., *5 Cumberland St. Camberwell.*—Imperial printing presses and bookbinding press.

[1602]

GARSIDE, HENRY, *Coupland Street, Manchester.*—Electrograph engraving machine for engraving copper cylinders used in calico-printing. (*See page 57.*)

[1603]

GEEVES, WILLIAM, *Caledonian Mills, New Wharf Road, Islington, N.*—Saw frame.

[1604]

GERISH, F. W., *East Road, City Road.*—A platen press, with rotary motive power.

[1605]

GHERLING, J., *15 William Street North, Caledonian Road.*—Eylet machines, various tools, and steelyards.

[1606]

GIBBS, D. & W., *City Soap Works, London.*—Machinery for grinding and compressing soap.

Obtained Prize Medal at the Great Exhibition, 1851.

The following are exhibited by MESSRS. GIBBS:—

MILL, CANNON, AND MACHINERY FOR CRUSHING, GRINDING, AND COMPRESSING TOILET SOAPS. Soaps finished by this method, being mechanically as well as chemi-

cally combined, are rendered thoroughly pleasant and free in use, without any excess of alkali.

Steampan fitted with archimedean screw, soap frame, and patent foot-lever press for manufacturing composite household soap.

[1607]

GLASGOW, JOHN, *Trafford Street, Manchester.*—Screwing machine.

[1608]

GLEN & ROSS, *Greenhead Engine Works, Glasgow.*—Rigby's patent double-acting steam-hammers, 2 cwt. and 5 cwt.

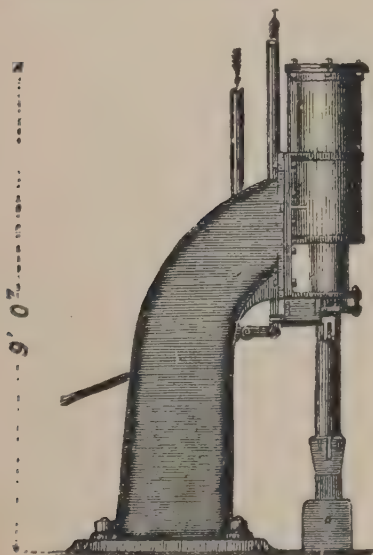


FIG. 2.

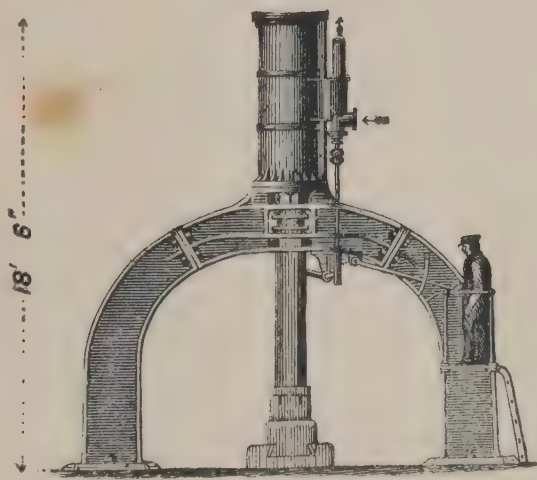


FIG. 1.

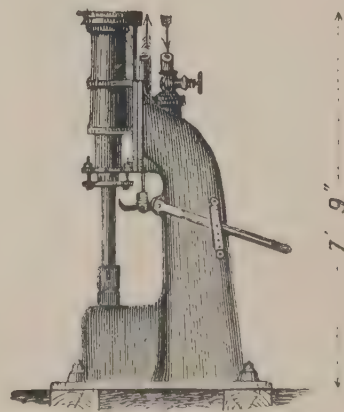


FIG. 3.

Fig. 1 is a representation of HAMMER FOR FORGING OR PUDDLING PURPOSES. They are made from 30 cwt. upwards. From the simplicity of their design and the substantial manner in which these hammers are constructed, they are easily kept in repair. The valve is so arranged that the under side of the hammer piston is never open to the atmosphere, whereby a great saving of steam is effected, especially when a large forging is under the hammer. To raise the hammer-piston, steam is admitted under it in the usual manner; but to accelerate its fall a communication is opened between the under and upper sides of piston. The upper side has an additional area equal to the cross section of piston rod, and the steam operating on this area produces a much sharper blow

than can be obtained from the hammer falling by its own gravity only. This, with the height under frames, renders the hammer of great service in deep forging.

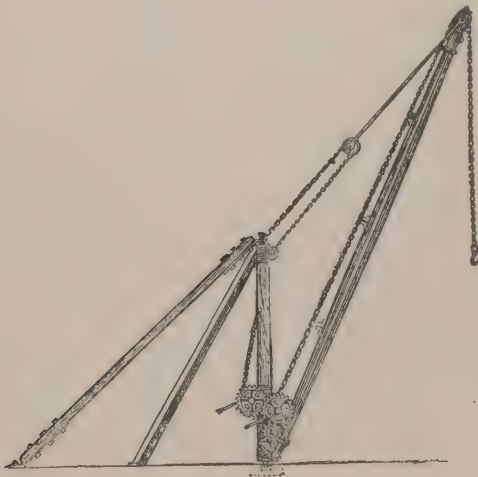
Fig. 2 shows a HAMMER FOR HEAVY SMITH-WORK. They are made from 5 cwt. up to 20 cwt. Full pressure of steam is admitted on the upper side of the hammer piston at pleasure, which gives great rapidity and power when required. They are very compact, and accessible to the workman on three sides.

Fig. 3 illustrates HAMMER FOR WORK OF A LIGHTER DESCRIPTION. They are made of 2 and 4 cwt. They differ from figure 2 only in having the anvil block and column cast in one piece.

Price, &c. may be learned by applying to the makers.

FORREST & BARR, Glasgow.—Patent safety derrick crane, for engineers, foundries, contractors, wharves, railways, quarries, and builders ; a planing and moulding machine.

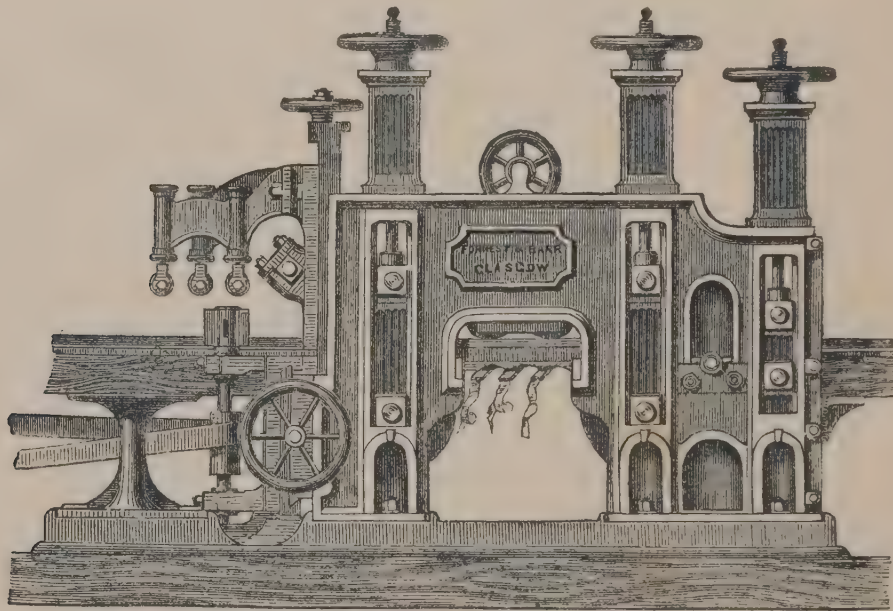
The following machinery exhibited and manufactured by Forrest & Barr may be seen in operation in London, Glasgow, and many other towns in England, Scotland, and Ireland ; as also in America, Australia, and Russia, and many places on the Continent.



PATENT SAFETY DERRICK CRANE.

CRANES :—

1. PATENT SAFETY DERRICK CRANE as represented in accompanying illustration, driven either by hand or steam power, made of any size required, for lifting from 1 to 50 tons. These cranes are extensively used by house and ship builders, quarriers, saw millers, &c. ; and are highly valued for their convenience, and the security against the falling of the jib, which the patent arrangement affords.
2. FOUNDRY CRANES of all sizes, with improved gearing by which the suspended load can be moved, and set to the required position, with steadiness and precision.
3. WHARF CRANES of all sizes and of various descriptions, suitable for particular positions.
4. WAREHOUSE CRANE, and various other winches and hoisting apparatus required for the storing of goods.
5. PORTABLE STEAM WINCH for building purposes ; engine and boiler placed upon a carriage. This is a very compact and useful machine, and can be applied to a variety of purposes.
6. STEAM WINCH for ships' decks. This machine is extensively used for loading and discharging ships, &c.



PLANING AND MOULDING MACHINE.

WOOD-WORKING MACHINERY :—

1. PLANING, MOULDING, TONGUEING, AND GROOVING MACHINE. This machine, which is represented in the above illustration, not only prepares all the various sizes of flooring, lining, and ship's deck planks, but is also adapted for the working of any form of moulding, from 12 in. in breadth, and 4 in. in thickness downwards. Ship builder's larger size, 24 inches broad and 6 inches thick.
2. MOULDING MACHINE, arranged for working mouldings only. This is a very beautiful, highly finished, and convenient machine. It has only been 3 years in use ; but during that time it has been much admired by all who have seen it in action. A number of samples of mouldings worked at the City Saw Mills, Glasgow, by it, are exhibited.
3. VERTICAL DIRECT-ACTING STEAM SAW FRAME, with single crank, for cutting square timber. This is a most substantial and compact machine. One has been in use over eight years, running at a high velocity, without requiring any repair, and has given the greatest satisfaction.
4. VERTICAL SAW FRAME for cutting square timbers, driven by belts and pulleys with crank shaft, either

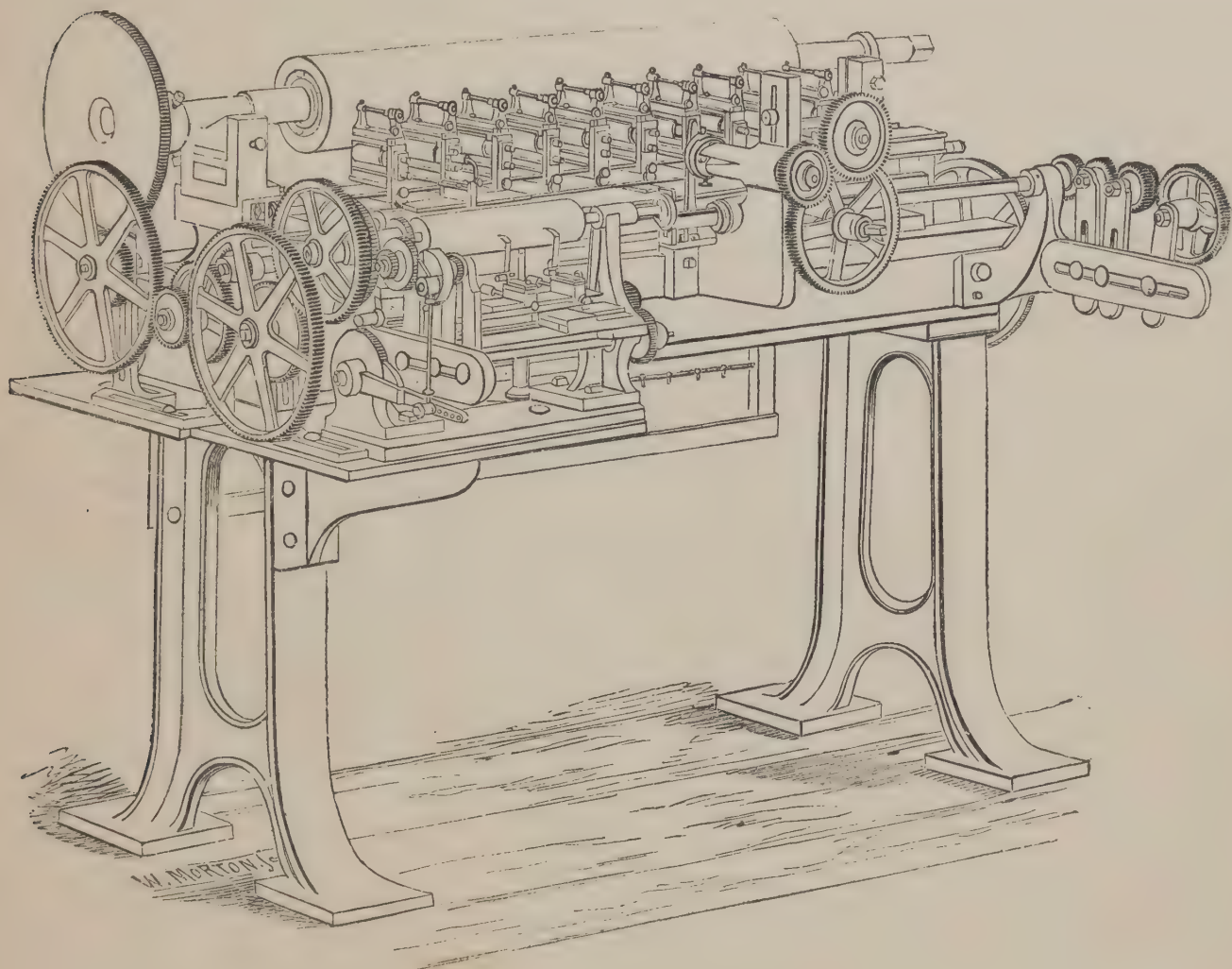
above or below the frame. These machines are constructed in a very substantial manner, and have been highly approved of.

5. SAW FRAME for cutting deals, driven from either above or below, and in which the deals are carried forward to the saws by rollers.
6. Combined machine for shipbuilders and others, comprising CIRCULAR SAW, BREAKING or OPENING SAW, and SQUARING MACHINE.
7. CIRCULAR SAW TABLES of various other descriptions and sizes, with or without self-acting feed gear, and with improved guides.

Forrest & Barr also manufacture high-pressure condensing and compound steam engines, with steam-cased cylinder, variable expansive gearing, surface condenser, and other fuel-economising improvements ; dye-wood chipping and grinding mills ; grain mills ; sugar mills ; and shafting and gearing of every description.

Engravings of the foregoing machinery, and full particulars as regards price, &c. may be obtained on application.

GARSDALE, HENRY, *Coupland Street, Manchester.*—Electrograph engraving machine for engraving copper cylinders used in calico-printing.



ELECTROGRAPH ENGRAVING MACHINE.

The machine represented in the accompanying illustration, is used for engraving the cylinders of copper or brass employed in the printing of woven fabrics and paper hangings.

A distinctive feature in this machine, apart from its general mechanical arrangement, is in the application of the subtle agency of voltaic electricity in communicating certain necessary movements, to important and delicate portions of the apparatus.

The cylinder to be engraved is first coated on its outer surface with a thin film of varnish, sufficiently resistant to the continuous action of the strongest acids. The required number of copies of the original design are then traced or scratched simultaneously by a series of diamond points, arranged on the machine parallel with the axis of the cylinder. The metallic surface is thereby exposed

in certain parts, and a bath of nitric or other acid being afterwards used to etch or deepen the engraved portions, the operation is completed.

Each diamond point is in connexion with a small temporary magnet, and the entire series is so arranged *en rapport* with the original design, that intermittent voltaic currents are established, which result in the diamonds being withdrawn from action at proper intervals. The precise adaptation can be understood only by observation of the machine itself.

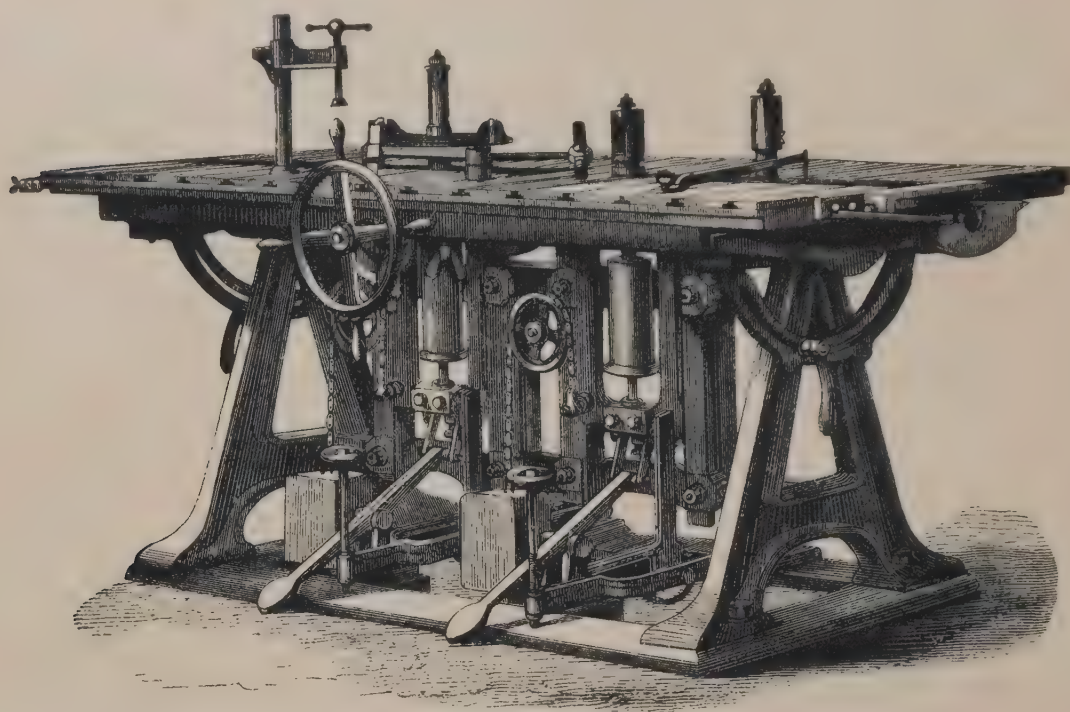
Amongst other special advantages of this apparatus, the facility with which engravings may be enlarged or diminished to any necessary extent, from the same original, is not the least important. Its capability of producing variety of result is very extensive.

[1609]

GRAFTON, HENRY, 80 *Chancery Lane*.—Cask and barrel machines, which cut and mould the wood hot ; machine for making solvable paper tubes.

[1610]

GREENWOOD & BATLEY, *Albion Works, Leeds*.—Machinery for working in wood and metals, cutting files, and making boots and shoes.



KINDER'S PATENT UNIVERSAL WOOD-SHAPING MACHINE.

KINDER'S PATENT UNIVERSAL WOOD-SHAPING MACHINE is manufactured by Greenwood & Batley, who are also makers of improved self-acting engineers' and machinists' tools of every description, and constructors of special machinery, including tools for making rifles

and rifled artillery ; moulding apparatus for shot and shell, &c.

London office, 20 Cannon Street. ARTHUR KINDER, Agent.

[1611]

GREIG, DAVID & JOHN, *Edinburgh*.—Paper-cutting machine, lithographic, copper-plate, and photographic presses ; case of copper and steel plates.

[1612]

GUINNESS & Co., 42, *Cheapside, London, E.C.*—Patent shuttle sewing machine.

These machines are recommended for their simplicity, economy, and durability. Being moved by cranks from one shaft they are more easily worked, less noisy, and far less liable to be put out of order than any other machine ;

while they possess the additional advantage of enabling the operator to work either backwards or forwards.

Price, on tables, £10 each ; in cabinets from £13, according to style and finish.

[1613]

HARRILD & SONS, 25 *Farringdon Street*.—Patent newspaper addressing machine, and other new printing materials.

[1614]

HARRISON, —, 16 *Bishopsgate Street Within*.—Magnetic printing press.

[1615]

HARRISON, C. W., *Lorrimore Road, Walworth*.—Electro-magnetic printing press.

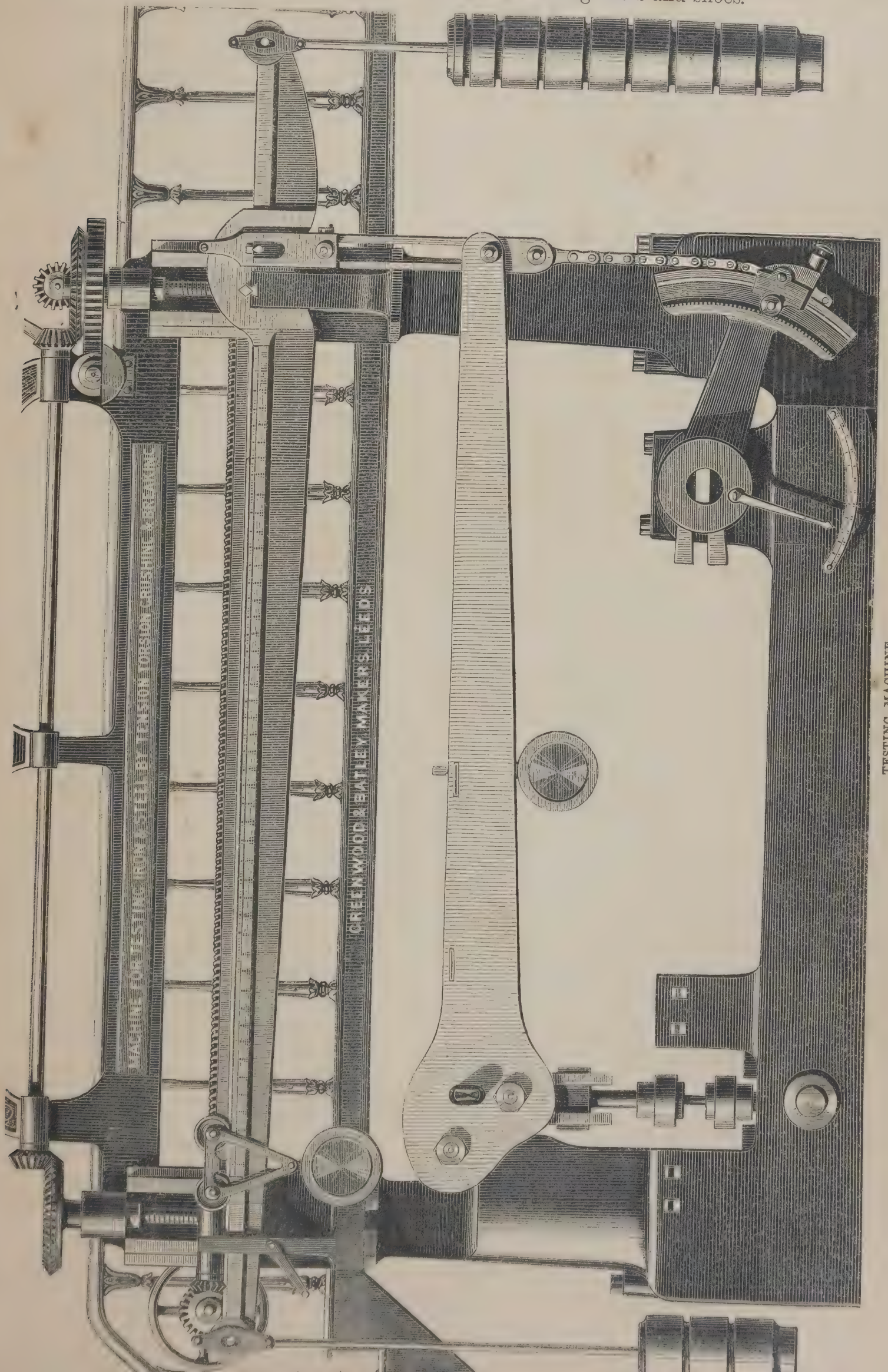
[1616]

HARVEY, G. & A., *Albion Works, Glasgow*.—Machine tools.

[1617]

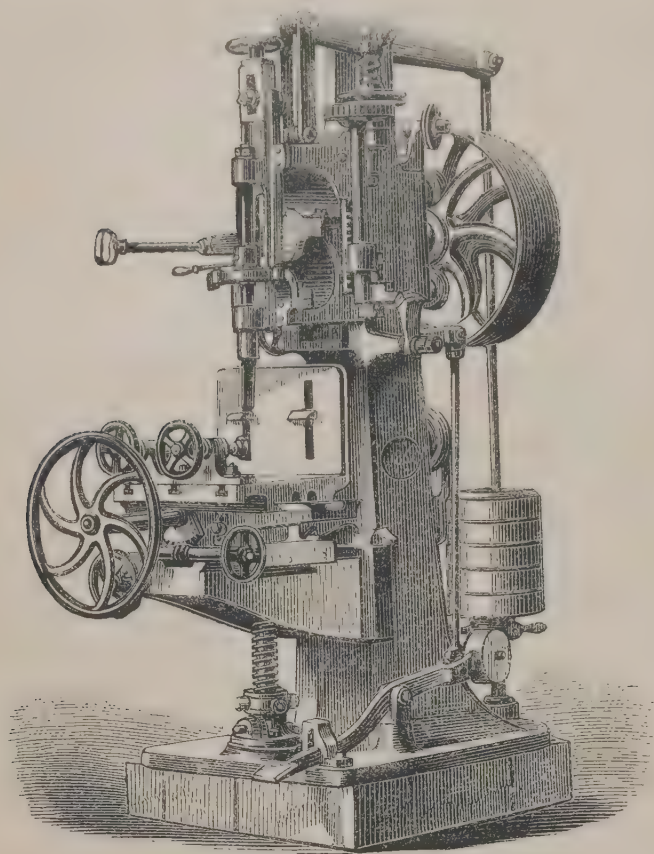
HAWKINS, JOHN, & Co., 16 *Station Street, Walsall*, and 38 *Lisle Street, London, W.*—Patent self-acting steam fly-press.

GREENWOOD & BATLEY, *Albion Works, Leeds, and 20 Cannon Street, London.*—Machinery for working in wood and metals, cutting files, and making boots and shoes.



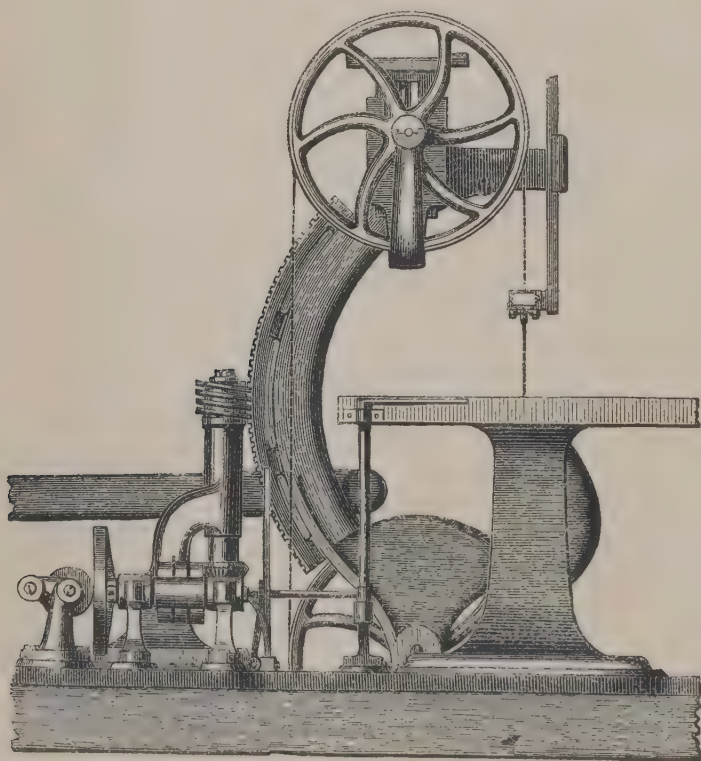
TESTING MACHINE.

GREENWOOD & BATLEY, *continued.*

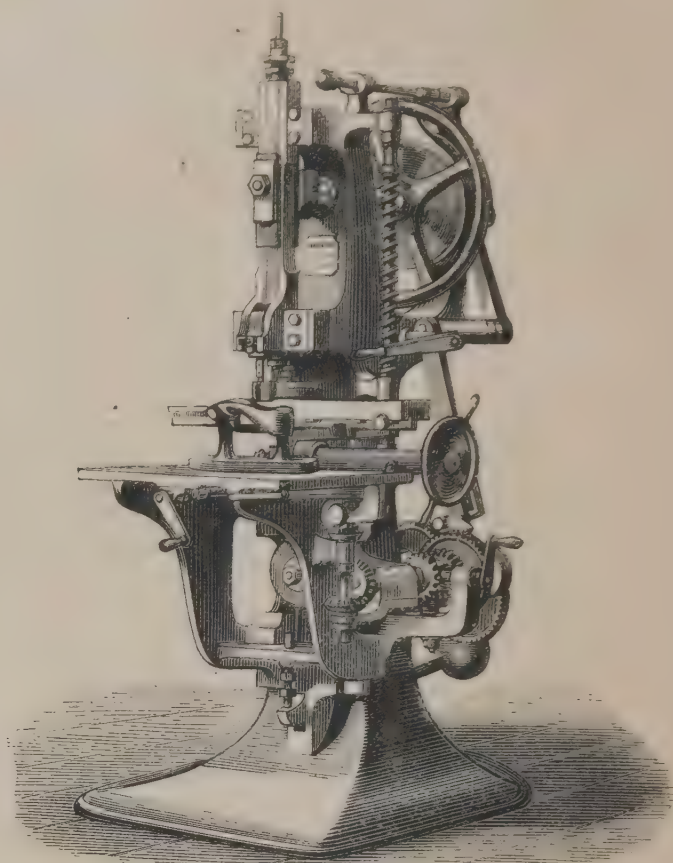


WOOD MORTICING MACHINE.

This machine has a self-acting downward feed motion, which brings the chisel gradually down to a stop at the required depth, when the head again rises ready for the next operation.

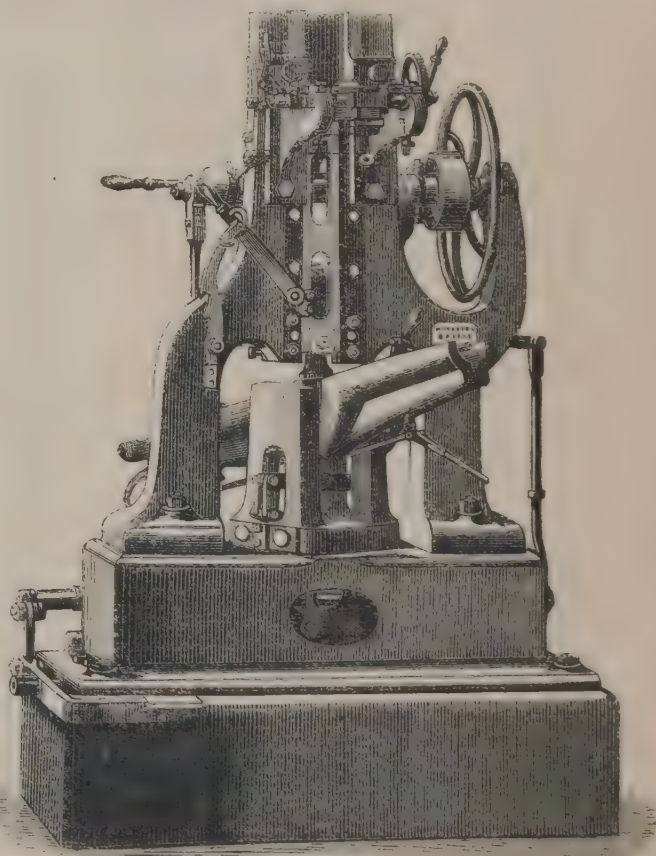


CURVILINEAR BAND SAWING MACHINE, with a variable and self-acting separate radial motion to the main casting, which is mounted upon trunnions so constructed that the surface of the table is on a line with the centre of the trunnion, thus permitting the saw to oscillate freely without changing its position in the surface of the table. A feed motion can be applied to the wood under operation, and this feed-motion can be driven from and combined with the oscillating motion, so as to reproduce any peculiar form required.



SHOE PEGGING MACHINE for nailing or pegging soles.

This machine is self-acting, and pegs round an ordinary shoe in about one minute; the pegs are cut from wire by a small detached machine, and placed as cut into a spiral groove, acted upon by a coiled spring so as to force each succeeding peg into its proper position for being driven. A number of these peg boxes are provided, so as to keep the machine supplied.

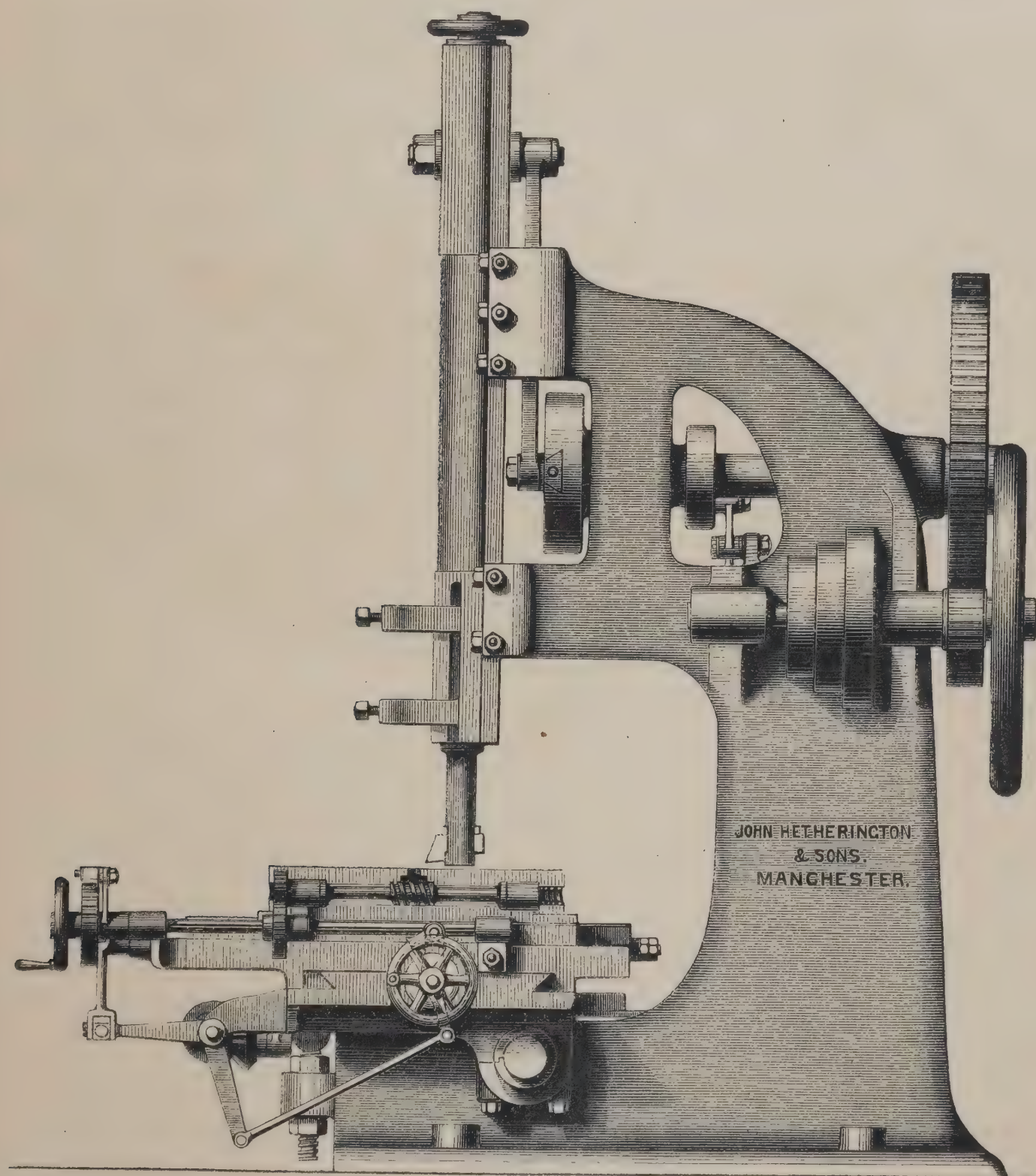


PATENT FILE-CUTTING MACHINE.

This machine is made to cut files from 12 in. to 18 in. long; and is fitted with apparatus for cutting hand, square, flat, half-round, round, equalling, and indeed every description of file in ordinary use, to any degree of fineness, at an average speed of 800 to 1000 strokes per minute.

[1618]

HETHERINGTON, JOHN, & SONS, *Vulcan Works, Pollard Street, Manchester.*—Tools.



SLOTING MACHINE.

THE FOLLOWING ARE EXHIBITED:—

A 12-IN. SELF-ACTING SLIDE AND SCREW-CUTTING LATHE, with fast and following back-gearred headstocks, fitted upon planed cast-iron bed 12 ft. long, with case-hardened spindle in conical bearing; with carriage for screw-cutting or sliding, traversed by means of a regulator or guide screw, and rack for hand traverse, including change wheels; also compound slide rest and improved screwing stay. Each lathe is supplied with 2 face-plates, Clement's driver, tool rest, boring rest, screw keys, and the driving apparatus.

VERTICAL RADIAL DRILLING AND BORING MACHINE, with self-acting feed motion. The drill is adjustable on a radial arm, movable through an arc of 280° from

a radius of 2 ft. 6 in. to 6 ft.; traverse of spindle 12 in.; vertical stroke of jib 2 ft.; capable of taking in an object 6 ft. from the floor; with holding-down bolts, screw keys, and the driving apparatus.

SLOTING MACHINE WITH VARIABLE STROKE up to 14 in. self-acting longitudinal and transverse slides, and self-acting revolving worm table, and also adjustable table for giving the requisite taper to key beds. It is adapted for grooving wheels, also for paring and shaping objects externally and internally. Each machine is supplied with screw keys, and the driving apparatus.

COMPLETE SET OF HAND SCREWING TACKLE, from $\frac{1}{4}$ to $1\frac{1}{2}$ in. Whitworth's thread.

Prices may be learned by application at the Works.

[1619]

HILL, PEARSON, *Bertram House, Hampstead, London.*—Post-office stamping machine, used in the English post-offices.

[1620]

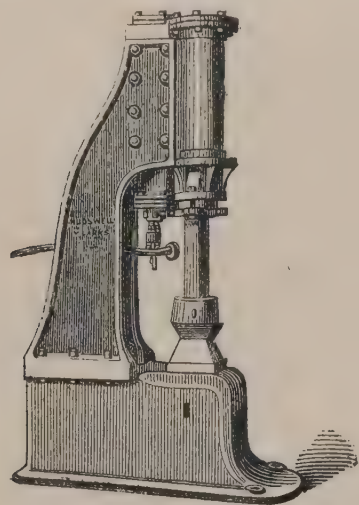
HOLDSWORTH, H., & Co., *Sheffield.*—Small hand tools.

[1621]

HOLTZAPFFEL & Co., 64 *Charing Cross, London.*—Lathes, sawing, cutting, grinding, measuring, drawing, and printing apparatus.

[1622]

HUDSWELL & CLARKE, *Jack Lane Engine Works, Leeds.*—Improved double-action steam hammers for smithing.



STEAM HAMMER.

HUDSWELL & CLARKE are manufacturers of locomotive and stationary engines, steam-cranes, steam-hammers, boilers, &c. The chief advantages of the steam-hammer exhibited by them are, simplicity of construction, facility for repairs, and lowness of price. The cost of their 4 cwt. hammer is £75, and they are supplied at proportionate expense from 1 cwt. upwards.

London Offices, 13, Parliament Street, Westminster.
Agent, E. B. SAUNDERS.

[1623]

HUGHES, HESKETH, *Homerton.*—Chain goffering machines; specimens of embossing in relief.

[1624]

HUGHES & KIMBER, *Red Lion Passage, Fleet Street.*—Lithographic and copper-plate press, &c.

[1625]

HULSE, J. S., *Manchester.*—Machine tools. (*See pages 62 and 63.*)

[1626]

HUNT, JOHN, & Co., *Clay Hall Iron Works, Old Ford, Bow, London.*—Patent machine for cutting the teeth of wood or metal wheels.

[1627]

HUNT & ROSKELL, 156 *New Bond Street.*—Process of cutting and polishing diamonds.

[1628]

IMRAY, JOHN, *Bridge Road, Lambeth.*—Imray and Copeland's patent steam hammer, with hydraulic anvil and striker.

This hammer is worked by steam pressure, both for raising and dropping it. The valve is of the most simple kind, and the ports are arranged so as to give an elastic cushion at top and bottom, and thereby to save the piston and cylinder from damage, whatever be the force of the stroke, or the clearance between the hammer and anvil.

The hammer is fitted to the end of the piston rod with an intervening liquid cushion, which, without in the least affecting the intensity of the blow, saves the rod from being upset or otherwise damaged, the concussion being converted into a diffused fluid pressure between the hammer and rod.

The anvil is mounted on the ram of an hydraulic cylinder, fitted with a valve for regulating the ingress or egress of water, so that the anvil with blocks or work on

it can be raised or lowered at pleasure; and a forging, with the necessary blocks or tools, occupying greater or less height, can be made to receive the blow at any required level. At the same time the shock is transmitted to the framing and foundation through a liquid cushion, which takes off the whole violence of the concussion, and thereby obviates the necessity for the great strength and solidity which are required for other hammers.

Anvils and strikers, constructed according to the hydraulic system, can be fitted to existing steam power or other hammers.

One of the patent hydraulic steam hammers can be seen in operation daily, at the works, 65, Bridge Road, Lambeth, London, where particulars can be obtained as to dimensions and prices.

[1629]

IRVIN & SELLERS, *Preston*.—Tools.

[1630]

JAKES, JAMES, *Prescot*.—Spring dividers, and compasses of various sorts.

[1631]

JARRETT, GRIFFITH, 37 *Poultry, City*, and 66 *Regent Street*.—Patent endorsing, linen-marking, and embossing presses. (*See page 64.*)

[1632]

JOHNSON, J. R., & J. S. ATKINSON, 31 *Red Lion Square*.—Machinery for casting and finishing type.

[1633]

JONES, JONATHAN, 35 *Holywell Lane, Shoreditch*.—Machinery for turning lasts, boot trees, and all irregular forms.

[1634]

JONES, LAVINIA, *Bradford-on-Avon, Wilts.*—Miniature Albion printing press, cases of type, and furniture, with appliances.

MINIATURE ALBION PRINTING PRESS, cases of type, furniture, rules, and chases, arranged as a cabinet for private use.

Illustrative specimen printed sheets in Continental and Oriental spoken languages.

The exhibitor gives instruction to ladies in composition and press work, and takes orders for the above cabinets and presses. Communications received, and interviews arranged, at the private office of the exhibitor, 2 Bow Street, Covent Garden, W.C.

[1635]

JONES, WILLIAM, 246 *High Holborn*.—Embossing and screw stamping presses.

[1636]

KEILA, WEDDERSPOON, *Perth*.—Marmalade-cutting machine; cinnamon and cassia cutting machine.

[1637]

KEITH, WILLIAM, 11 *Three Crown Square*.—Improved sewing machine.

[1638]

KENDALL & GENT, *Salford, Manchester*.—Patent self-acting machine, for cutting tubes for engineers and boiler makers.

[1639]

KENNAN & SONS, *Fishamble Street, Dublin*.—Sculpturing machine; amateurs' lathes; specimens of mechanical sculpture and turnings.

THE FOLLOWING ARE EXHIBITED:—

MACHINE FOR COPYING WORKS OF ART, &c. from the round or flat, upon any scale, in ivory, wood, alabaster, &c. It is easily worked by one person. The movement for copying proportional straight lines is unique. The cutting is performed by a revolving tool, mounted on a bar with universal centre, and guided by a tracer applied to the original. It will copy the most intricate forms.

SPECIMENS OF MECHANICAL SCULPTURE, showing the powers of the machine.

ORNAMENTAL TURNING LATHE with improved slide rest and Kennan's universal geometric cutter; apparatus for cutting screws; improved chucks; cutter bars, &c.

SPECIMENS OF TURNINGS executed by Kennan's lathes.

AMATEURS' CIRCULAR SAWING MACHINE with parallel and angular gauges.

AMATEURS' VERTICAL DRILLING MACHINE.

[1640]

KERSHAW, J. & J., *Store Street Works, Manchester*.—Double stud lathe bench shaping machine.

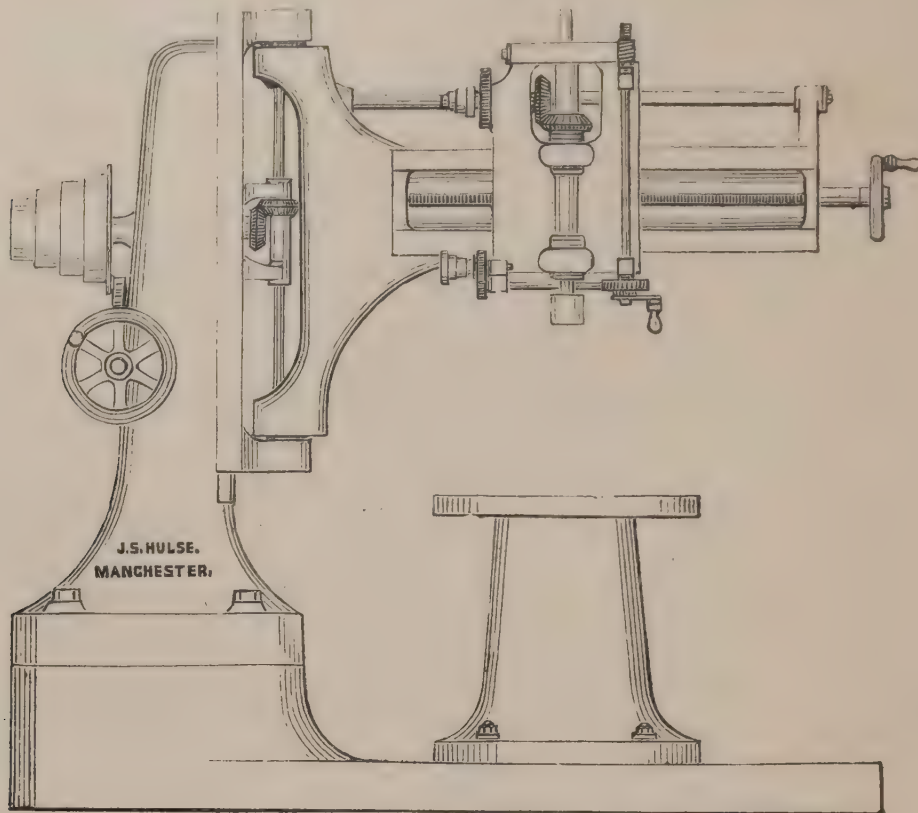
[1641]

KIRKSTALL FORGE COMPANY, THE, *Leeds*, and 35 *Parliament Street, Westminster, S.W.*—Naylor's single or double action steam hammer. (*See page 65.*)

[1642]

LAMB, J., *Holborn Paper Mills, Newcastle, Staffordshire*.—Laying apparatus, attached to paper-cutting machine, felt not required. (*See page 66.*)

HULSE, J. S., *Manchester.*—Lathes; planing, slotting, drilling, boring, screwing, wheel-cutting, punching, and shearing machines.



BORING MACHINE.

JOSEPH HULSE, who for seventeen years was with Messrs. Whitworth & Co. exhibits the following machine tools, viz.:—

Slide and screw-cutting lathes, from 5 to 24 in. centres, of any length.
Hand turning lathes, from 5 to 24 in. centres, of any length.
Gap and break lathes, from 5 to 24 in. centres, of any length.
Foot lathes, slide or hand.

Railway wheel turning lathes, for 4, 5, 6, 7 and 8 ft. wheels.

Headstocks, slide rests, universal chucks, to suit any lathes.

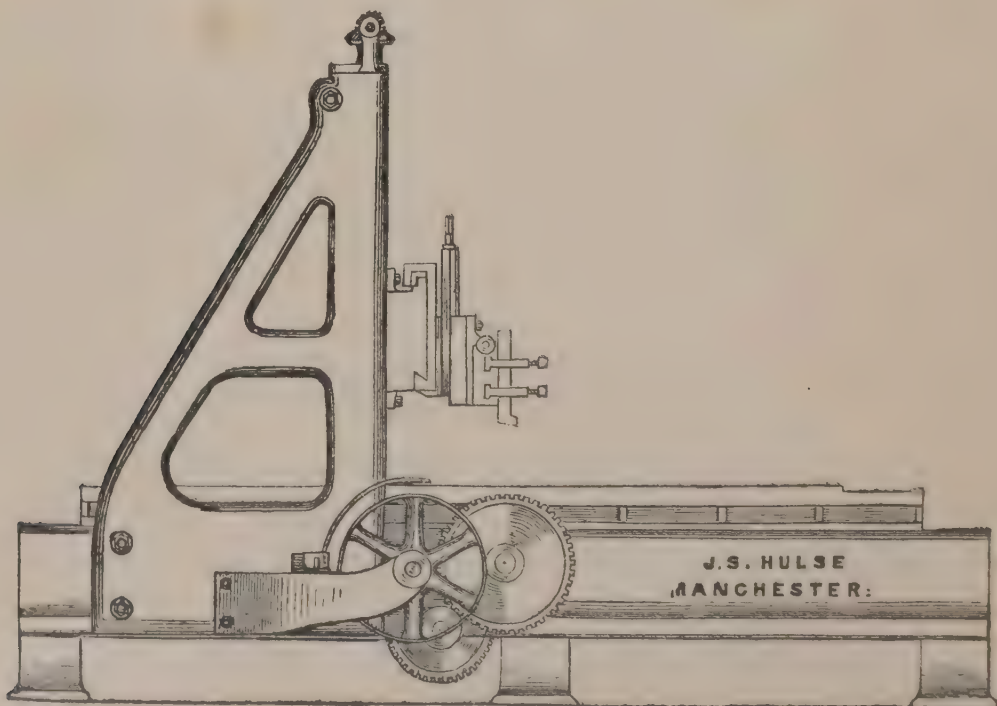
Planing machines, to plane from 1 ft. 6 in. to 10 ft. in width and height, and any length.

Brackets, for side planing.

Shaping machines, from 4 to 24 in. stroke of any length.

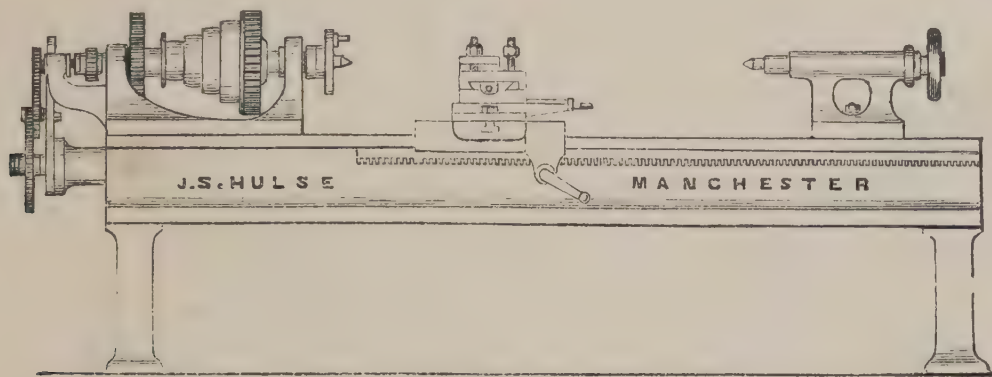
Bench shaping machines, from 2 to 5 in strokes.

Slotting machines, from 6 to 24 in. stroke.



PLANING MACHINE.

HULSE, J. S., *continued.*



SCREW-CUTTING LATHE.

Bench slotting machines.

Vertical drilling machines, single and double geared.

Bench drilling machine, for hand or power.

Pillar drilling machines.

Radial drilling machines, single and double geared.

Horizontal radial drilling machine, ditto ditto.

Tube plate drilling machines.

Angle iron drilling machines.

Horizontal boring machines.

Portable boring apparatus.

Punching and shearing machines.

Bar-cutting machines.

Sawing machines for hot iron.

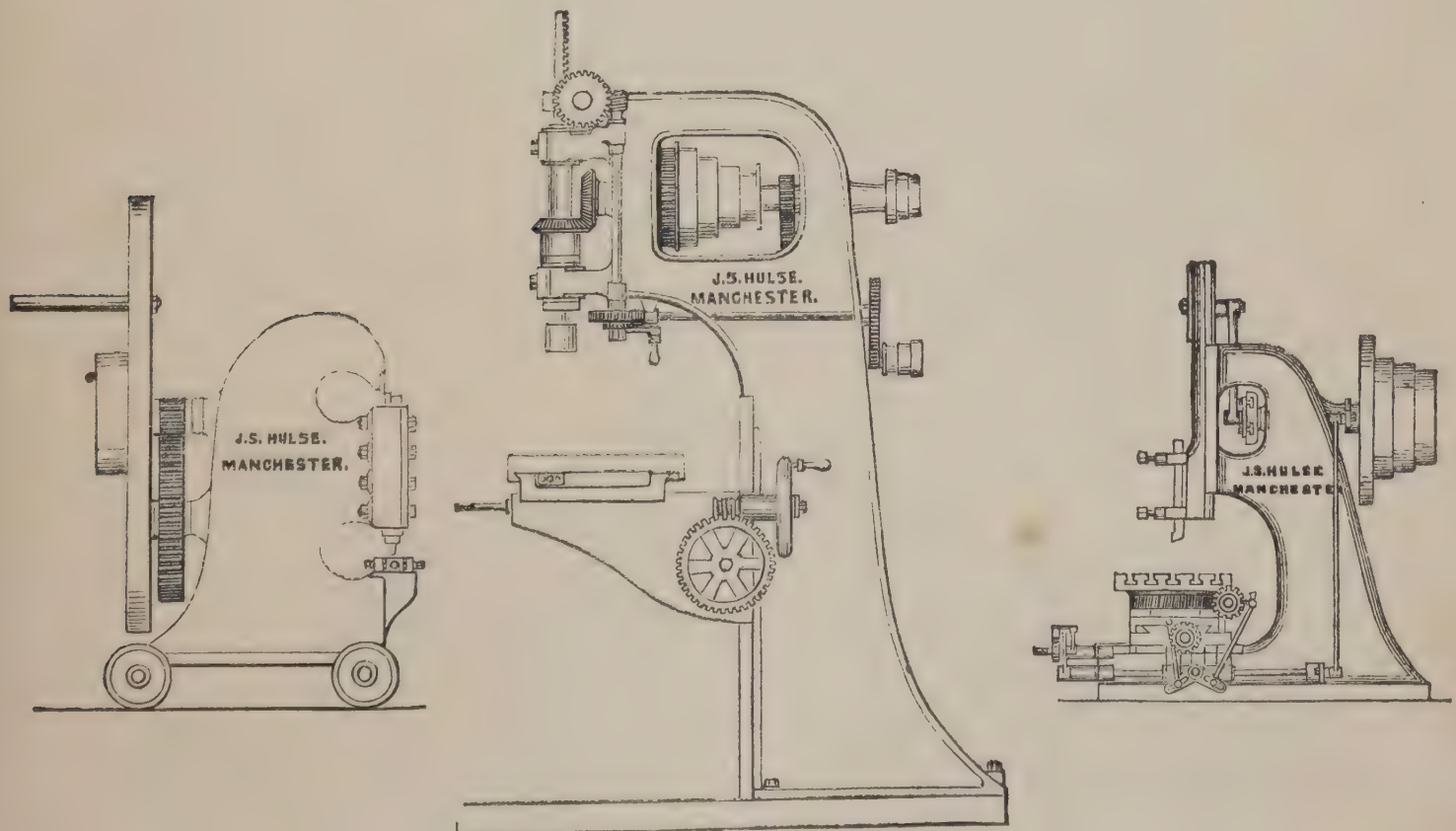
Sawing machines for boiler tubes.

Tube-cutting machines.

Plate-bending machines.

Wheel-cutting machines.

Cutter-forming machines.



PUNCHING, DRILLING, AND SLOTTING MACHINES.

Nut-shaping machines.

Sawing machines, with circular saw for wood.

Ribbon saw.

Hydraulic mandril press.

Grindstone frames.

Portable vice benches.

Hand driving wheels.

Drill braces and frames.

Standard gauges.

Surface plates and straight edges.

Screwing machines, of any required range.

Screw stocks, dies and taps (Whitworth's threads and sizes).

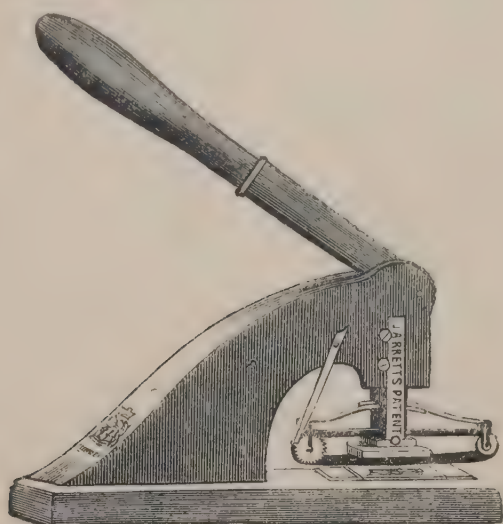
Improved machine vices, suitable for shaping, planing, and drilling machines.

Cast-iron billiard tables.

Steam hammers.

Dynamometers.

JARRETT, GRIFFITH, 37 *Poultry, City*, and 66 *Regent Street*.—Patent endorsing, linen-marking, and embossing presses.



PATENT PRINTING PRESS. (Fig. 1.)

JARRETT'S PATENT ENDORSING PRESSES, for printing in colours without the use of fluid inks.

The very general objection to endorsement stamps, &c. where fluid ink is used, from the inconvenience incident upon the drying or caking of the ink, which renders the production of a correct or satisfactory impression so uncertain, has induced the patentee of the above press to substitute carbonic or other chemically prepared paper, silk, or other suitable material, instead of the ordinary printing ink. This chemically prepared material is formed into endless bands, which are capable of giving more than a thousand impressions before requiring to be changed.

JARRETT'S PATENT PRINTING PRESS is a self-acting apparatus, adapted for the desk, counter, or writing table; it is very portable, and easily worked by the hand.

The stamping action of the machine brings continually a fresh supply of colouring matter to the die or type, so that there is no interval of time wasted between the successive impressions, and the press is always ready for use.



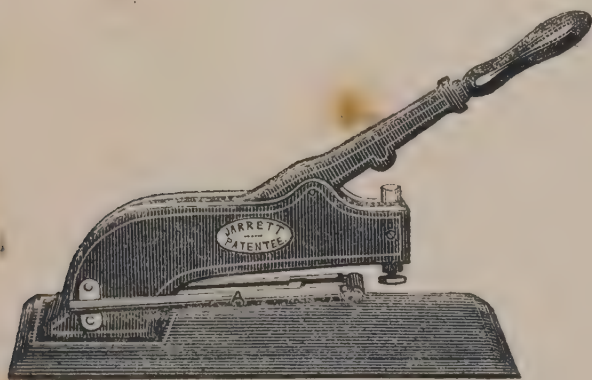
PATENT PRINTING PRESS. (Fig. 2.)

In the press shown in Fig. 1, the die or type-holder is attached to the slide of the press by means of a taper-dovetailed key, so that it can be instantly removed for changing the dates, or for being replaced by another die.

In the press got up as Fig. 2, which is more particularly adapted for movable types, the dies or types are placed below with their face upwards, so as to be more easily changed. In this press the endless band being double the length of the press, will yield some thousands of impressions before it is exhausted.

Among the purposes to which this press is eminently adapted may be mentioned the endorsing of cheques, &c. the stamping on prices current, sale lists, bills of lading, tradesmen's bills, prescription wrappers, cards, letters, books, &c. Prices:—

For medium size endorsing press, as similar to either figure, including an electrotype die, 1½ in. in length, with name, business, and address, in Roman or Egyptian letters. . .	1½ gs.
For large size, furnished as preceding, with 2¾ in. die . . .	2 gs.
For extra large size, ditto, 3½ in. die	2½ gs.

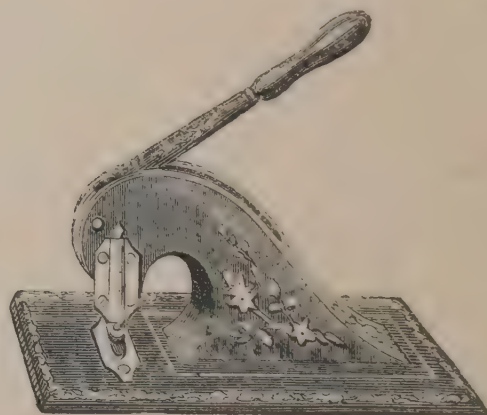


PATENT MARKING LINEN PRESS.

JARRETT'S PATENT SELF-INKING PRESS, for marking linen with indelible ink, applicable also for endorsing.

The above press entirely supersedes the pen, the hand-stamp, and the stencil-plate. It is portable, self-acting, and so easy in its application, that a child may by its means stamp a hundred pieces of linen in a few minutes.

The small size marking-linen press, including a prepared roller, a bottle of the best marking ink, together with an electro-plated die (not exceeding 1½ in.), with the engraving of either a coronet, crest, or initials, or name, price 25s. complete.



IMPROVED EMBOSSING PRESS.

JARRETT'S IMPROVED EMBOSSING PRESSES, for easily and effectively embossing coats of arms, crests, initials, residences, or business impressions, on note or letter-paper, envelopes, books, official documents, certificates, agreements, &c.

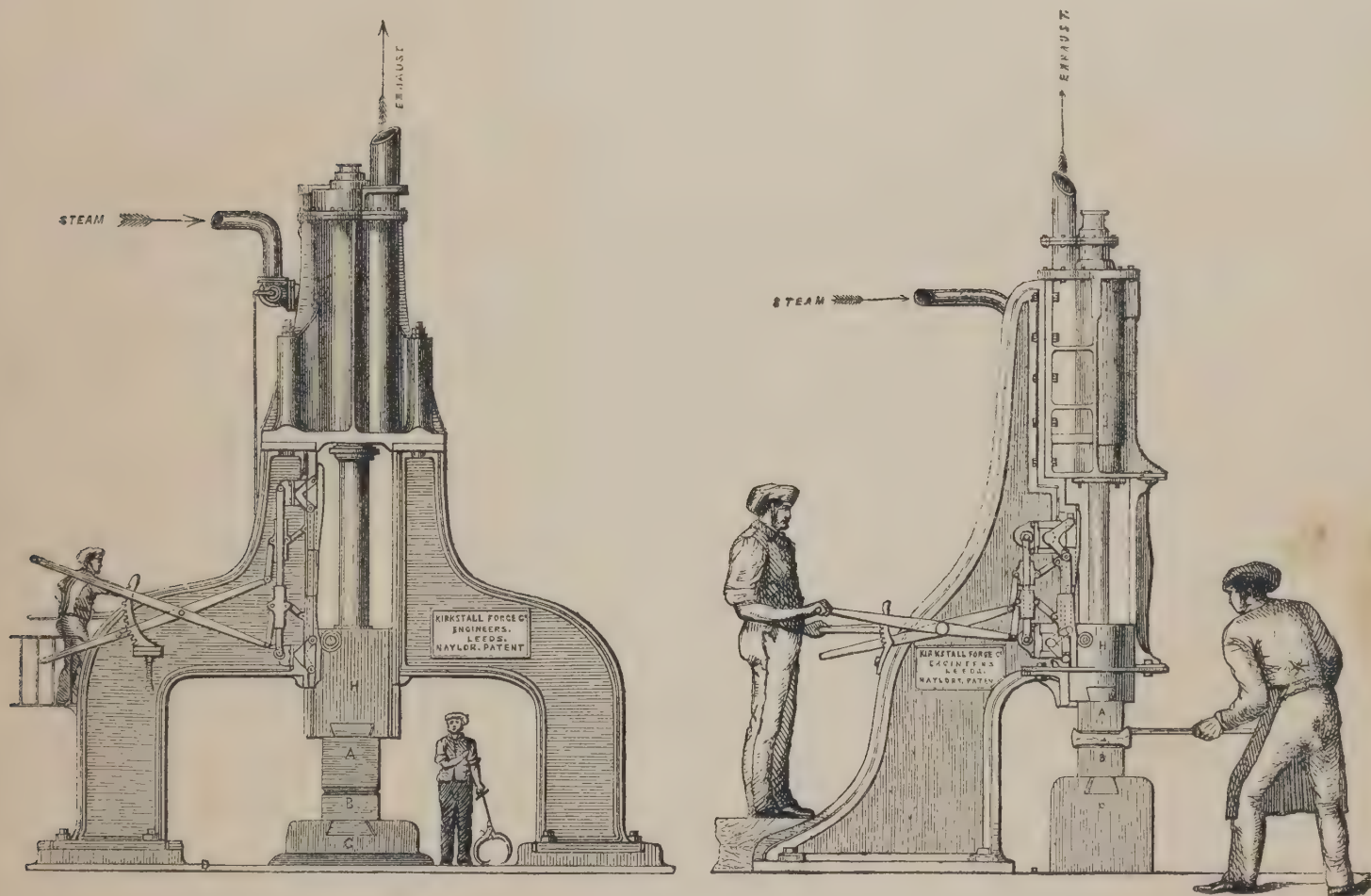
The dies in Jarrett's improved embossing presses are all of steel, polished and properly tempered. The counter-parts are of hardened copper.

Upwards of 30,000 different impressions taken by these presses may be inspected.

Price of press with engraved die complete,
from 14s. 6d.

KIRKSTALL FORGE COMPANY, THE, *Leeds, and 35 Parliament Street, Westminster, S.W.*—
Naylor's single or double action steam hammer.

*Obtained Prize Medal for railway wheels and axles, Class 5, Exhibition, 1851;
also Honourable Mention, iron and steel, Class 1.*



STEAM HAMMERS.

NAYLOR'S PATENT SINGLE OR DOUBLE ACTION STEAM HAMMERS.

The valuable improvements developed in these hammers, also the great advantages and capabilities which they possess over all others that have hitherto been invented, are the following :—

STEAM HAMMERS which have hitherto been constructed involve the same general principle of being lifted by steam pressure, and falling by gravity, the effect of the blow being dependent on the weight of the hammer, multiplied by the height of its fall.

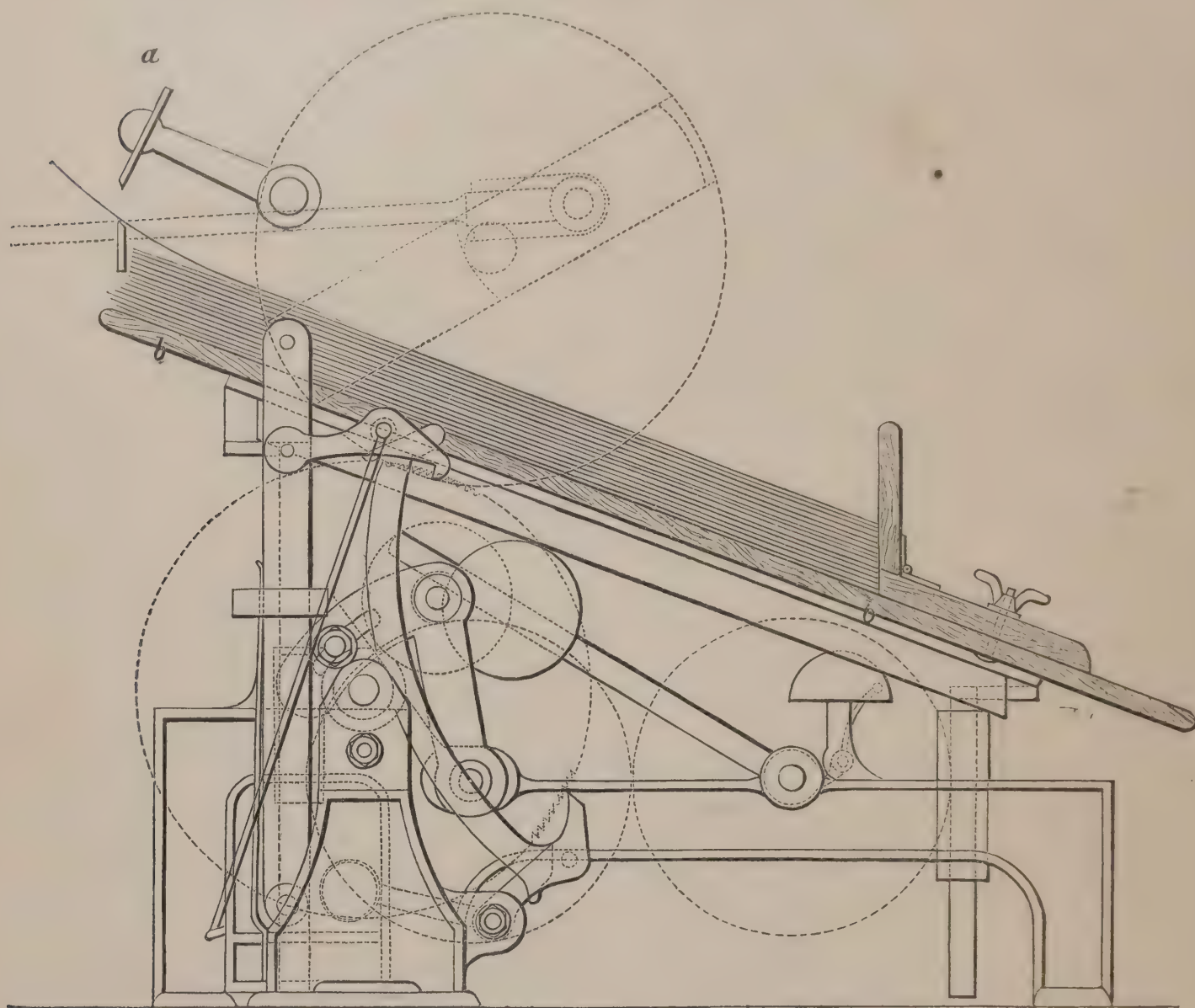
The greater the distance it falls, consequently the greater the force of the blow, the slower is the speed of working. The great practical drawback to the more extended application of steam hammers, has been the impossibility of obtaining sufficient speed or quickness of stroke.

The advantages of the DOUBLE-ACTION STEAM HAMMER for forging are its being capable of working up to 200 strokes per minute (when required), which is from three to four times faster than any steam hammer hitherto constructed. The power can also be more than doubled, instantaneously, and as rapidly altered. The adjusting valve gearing also allows of instantly changing the length of stroke, and force of blow, by altering the position of the sliding wedges.

It is completely under the control of the hand gear, which is easy to work in any position. The rapidity of the stroke obtained by it is particularly advantageous for forgings requiring a great number of blows, by finishing the work at one heat, and saving both the fuel required for the second heat and the deterioration and waste of the iron.

This principle of hammer is also adapted for riveting wrought-iron bridges, girders, ship-building, &c.

LAMB, J., *Holborn Paper Mills, Newcastle, Staffordshire.*—Laying apparatus, attached to paper-cutting machine, felt not required.



LAYING APPARATUS FOR PAPER CUTTING MACHINERY.

The above patented apparatus, applicable to machines for cutting paper, may fairly claim to be the completion of the paper-making machine. The object of it is to collect the paper in piles or heaps, and to dispense with the manual labour hitherto required for that purpose. *a* represents the knife, forming part of an ordinary paper-cutting machine; and *b* the patent laying table on which the paper is deposited. In proportion as the paper accumulates on the laying table, it is gradually lowered by means of self-acting mechanism.

When nearly a sufficient quantity of paper has been thus deposited on the laying table, a bell is rung by the machine to give warning; the machinery by which it is lowered soon after throws itself out of gear; the attendant then removes the piles or heaps of paper, the platform rises up to its original position, and the operation continues as before.

In most of the cutting machines a felt is generally required, on which the paper drops after being cut by the knife *a*, and an attendant is employed, in nearly every case, to catch the sheet or sheets of paper so cut, but by this apparatus the felt and the attendants are dispensed with, thereby not only effecting a considerable saving in wages, but avoiding the injury and waste resulting from finger marks.

This machine has been in successful operation at the Holborn Mills, Newcastle-under-Lyme, Staffordshire, for several years, and may be seen at work on application.

For further particulars apply to the Patentee, to MESSRS. HETHERINGTON & SONS, Vulcan Foundry, Manchester, makers, or to MR. WALTER IBBOTSON, Agent for the same, 8 Dickinson Street, Manchester; and in the Exhibition Building, to MR. S. MUIR, JUN., of 40 Broad Street Buildings, London.

The following amongst other testimonials is submitted:—

*“Hollins Paper Mills, Darwen, Lancashire.
February 17, 1860.*

MR. LAMB,

Sir,—We have worked the first of your laying machines upwards of three years, and the second nearly two years. We are quite satisfied with the working of them both, and we consider your machine a most useful auxiliary to the paper-cutting machine. In our opinion no cutting machine is complete unless your laying apparatus is attached thereto.

Yours truly,
C. POTTER & Co.”

[1643]

LANCELOTT, JAMES, 4 *Clifton Terrace, Birmingham*.—Machine for making sheet-metal chains.

[1644]

LEE, H. C., 11 *Laurence-Pountney Lane, E.C.*—Knitting machine.

[1645]

LEGG, ROBERT, 14 *Owen's Row, Clerkenwell, London*.—Combined compressing and cutting machine for tobacco ; Legg's 4-horse power steam engine.

[1646]

LEIGH, EVAN, & SON, *Manchester*.—Case of patent top rollers, with loose bosses ; model of improved patent sailing and steam ship.

[1647]

LELY, AFFIFI, *Redditch*.—Machine for grooving sewing-machine needles ; machine for polishing the eyes of needles.

The following machines are exhibited.
PATENT GROOVING MACHINE, for grooving sewing machine needles.
COMBINED WEIGHING MACHINE AND PACKING PRESS

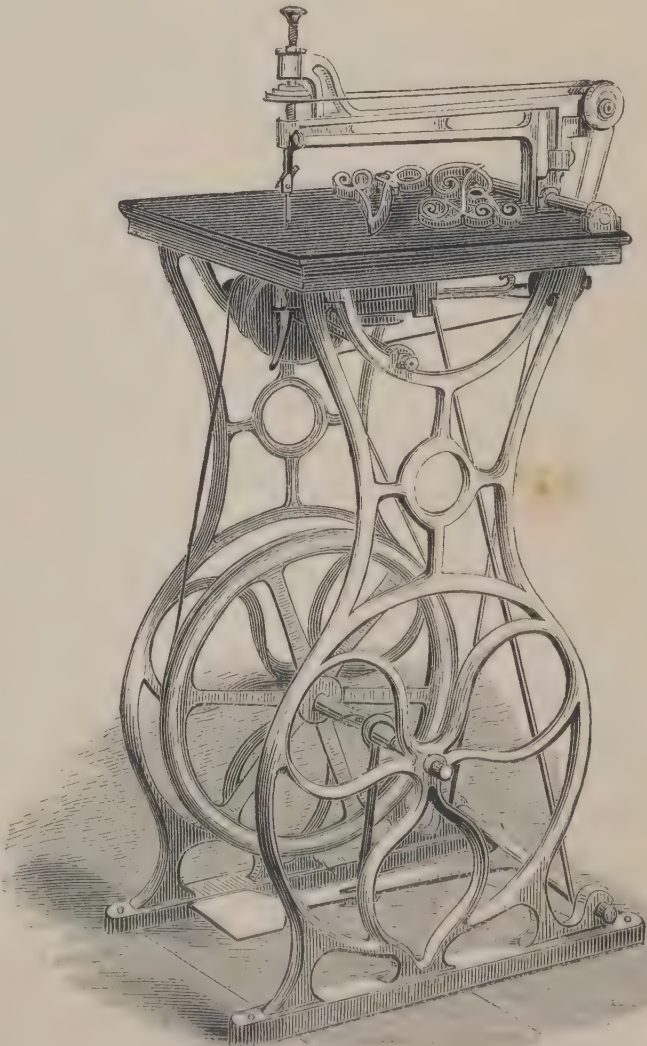
for packing powders of any description, accomplishing 20 or more packets at one blow, or 10 cwt. in 10 hours.
BURNISHING MACHINE for polishing the eyes of needles.
Various machines used in the manufacture of needles.

[1648]

LEWIS, JOSEPH, 51 *High Street, Bloomsbury, W.C.*—Patent machine for boring and fret cutting.

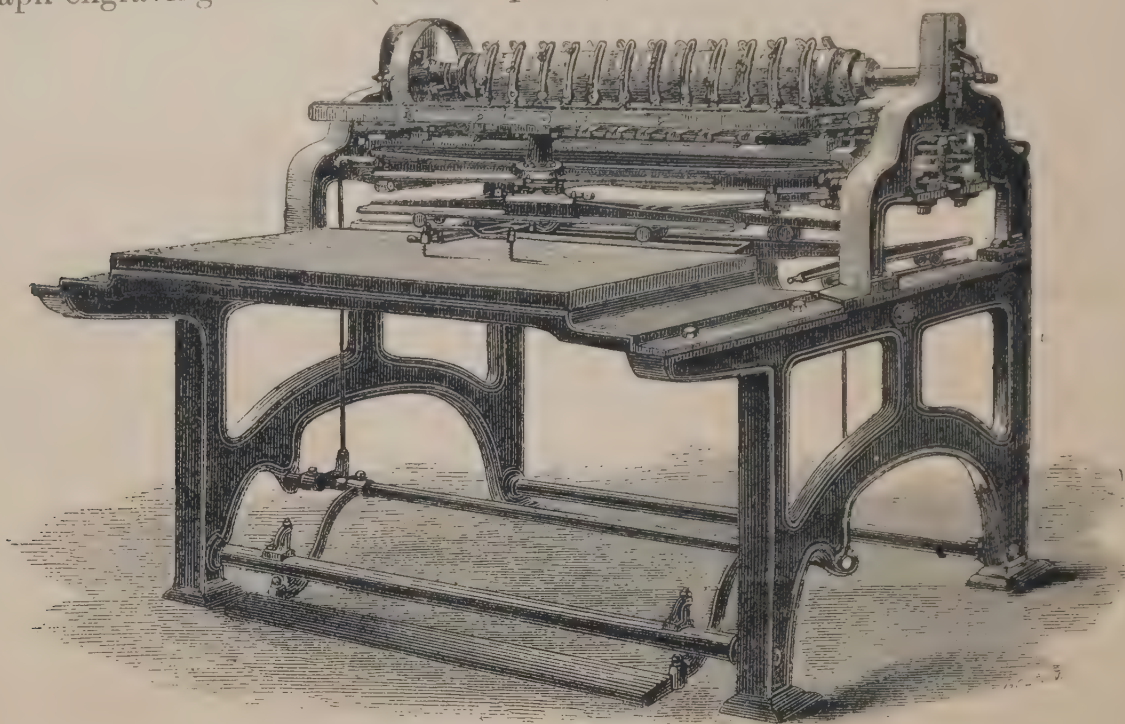
The machine exhibited is adapted for ladies' use.
It may be seen in action at Mr. Lewis' manufactory.
Price,
Without drill. £7 0
With drill. 8 0

The exhibitor is prepared to supply larger machines for the trade, at proportionately low prices and is a manufacturer of new inventions and machinery in general.



[1649]

LOCKETT, JOSEPH, SONS, & LEAKE, *Manchester*.—New and improved patent double-bar pentagraph engraving machine (Shield's patent).



PATENT DOUBLE-BAR PENTAGRAPH ENGRAVING MACHINE.

By this machine the system of pentagraph engraving, now universal, receives further and more perfect development.

The advantages to the operator are :—

1. Any enlargement of sketch can be used from 2 to 10, thus allowing adaptation to the various peculiarities of design, and great economy of sketch-making and zinc-cutting in large designs.

2. Unerring fitting from both bars—durable working qualities—all bands and pulleys being dispensed with.

3. The sketch may be made to an approximate girth of roller; thus enabling the zinc to be prepared before the rollers are applied.

4. Any angle to 3 inches may be given to cross-over lines, and fractional steppings at the side are greatly facilitated.

5. The pattern table is flat, a sensible relief to the workman.

6. The fittings for handkerchief rollers do not necessitate any change in the construction of the machine: the diamond bars are the same as for garment rollers.

IMPROVED PATENT DOUBLE-BAR PENTAGRAPH ENGRAVING MACHINE. (Rigby's Patent.)

This machine during the last five years has been widely adopted in Great Britain and on the Continent. By its use the system of pentagraph engraving has been mainly established.

[1650]

LYONS, MORRIS, 143 *Suffolk Street, Birmingham*.—Apparatus for depositing metals from new solutions, and for shaping a new plastic compound.

[1651]

MACLEA & MARCH, *Leeds*.—Double-wheel lathe, self-acting slithe lathe, planing, shaping, and slotting machines.

THE FOLLOWING MACHINES ARE EXHIBITED :—

DOUBLE-WHEEL LATHE, for turning up a pair of 6-ft. wheels on their axle.

7-in. CENTRE DOUBLE-GEARED SELF-ACTING SLIDE LATHE, 7 ft. bed.

DRILLING MACHINE, DOUBLE-GEARED, 12-in. traverse.

PLANING MACHINE, to plane 6 ft. long, 3 ft. wide, and 3 ft. high, self-acting in all cuts.

IMPROVED SHAPING MACHINE, 12-in. stroke on 4 ft. bed.

SLOTING MACHINE, 6-in. stroke, to admit 2 ft. 6 in. diameter, with self-acting compound slides.

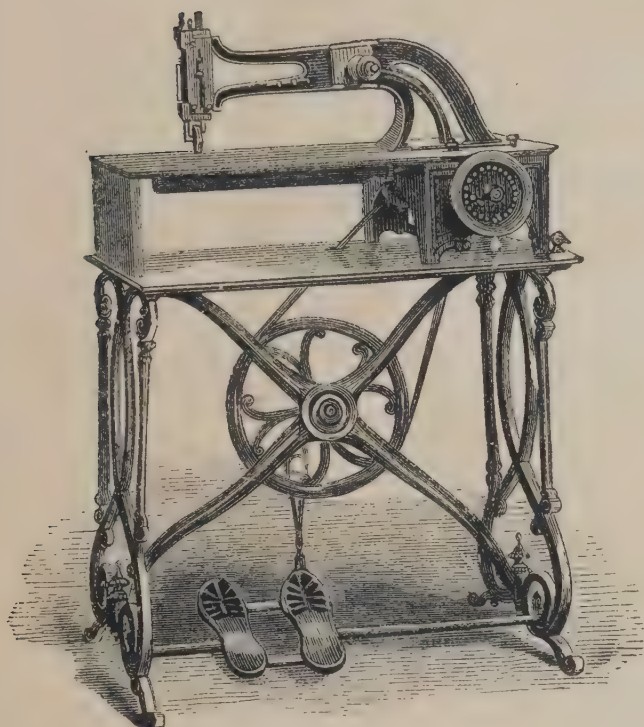
[1652]

MCDOWALL, JOHN, & SONS, *Walkinshaw Foundry, Johnstone, Glasgow*.—Planing and moulding machine, and saw-bench, for wood-cutting.

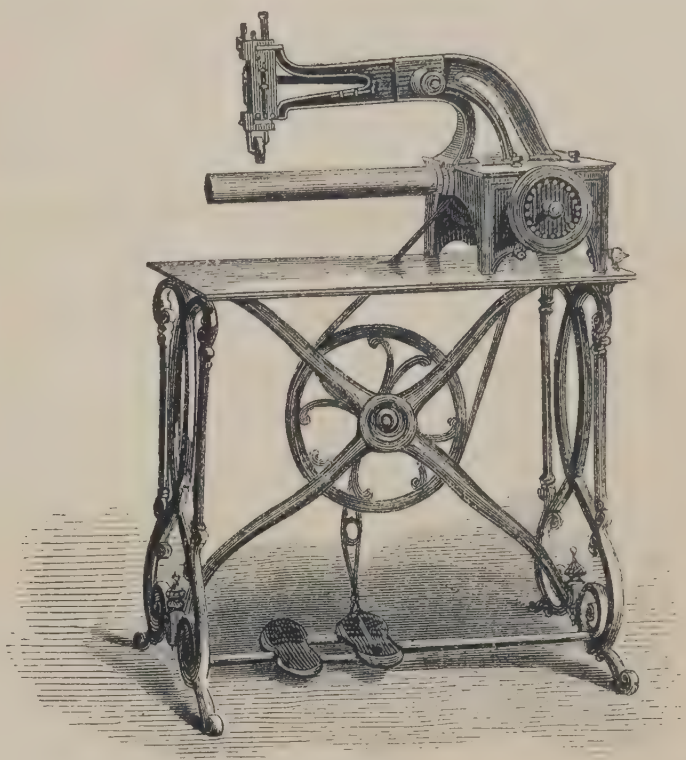
[1653]

MACKENZIE, A., & Co., 32 *St. Enoch Square, Glasgow*.—New double-action cylinder sewing machine. (See page 69.)

MACKENZIE, ALEXANDER, & Co., 62 *North Frederick Street, Glasgow.*—New double action cylinder sewing machine, with specimens of work.



MACHINE, WITH TABLE, AND SUITED FOR ALL THE PURPOSES OF AN ORDINARY MACHINE.



MACHINE AS USED FOR CYLINDRICAL WORK, AS BOOT LEGS, TROUSERS, SLEEVES, &c. PATENTED 7th FEBRUARY, 1862.

The continual demand for a machine capable of working in either direction at will, without the necessity of detaching and substituting other parts of machinery, which were in many cases laid aside, and always troublesome, led to the invention of this machine, where the same working parts operate in both actions.

This machine has a cylindrical arm, 15 in. long, and

2 in. diameter, enclosed in a brass tube; and at the will of the operator, can be made to sew either in the ordinary, or in the lateral direction from left to right, by simply turning the tube half-way round, and turning the presser (which is carried in a separate frame concentric with the needle) at right angles to its former direction.

[1654]

McKERNAN, L., 98 *Cheapside.*—Sewing machines.

[1655]

McQUEEN, BROTHERS, 184 *Tottenham Court Road.*—Process of plate printing.

[1656]

MARSHALL, THOMAS J., 80½ *Bishopsgate Without.*—Paper-making machines, patent pulp strainer, cutting machine, and watermarking rollers.

[1657]

MATHIESON, ALEXANDER, & SON, *Tool Works, East Campbell Street, Glasgow.*—Planes, mechanical, engineering, and edge tools.

[1658]

MIERS, W. J., 15 *Lamb's Conduit Passage*.—Machine for cutting geometrical forms.

[1659]

MILLER & RICHARD, *Edinburgh and London*.—Printed specimens of types.

[1660]

MILLS, J., late MILLS & ROBERTS, *Stockport*.—Tapered pins, and finished keys, by patent machinery.

[1661]

MILWARD, HENRY, & SONS, *Redditch, Worcestershire*.—Processes in needle-making machinery.

[1662]

MITCHEL, WILLIAM II., 16 *Newton Street, High Holborn, W.C.*—Type composing and distributing machines.

This machine has been largely and successfully used in America, as well as in some of the leading printing houses of England and Scotland. It may be applied to every description of plain book or newspaper work; and	effects a large reduction in the cost of composition, in the wear and tear of type, and in the quantity of type required for a given amount of work.
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[1663]

MORGAN & Co., *Paisley*.—Block-cutting machine.

[1664]

MORISON, JAMES, & Co., late J. & G. MORISON, *Abbey Mill, 15 Abbey Close, Paisley*.—Piano card-perforating machine.

[1665]

MORRALL, ABEL, *Studley Mills, London and Manchester*.—Needles and thimbles in process of manufacture.

[1666]

MORRISON, R., & Co., *Newcastle-on-Tyne*.—Steam hammer with piston and bar forged solid. (See pages 74 and 75.)

[1667]

M'QUEEN, BROTHERS, 184 *Tottenham Court Road*.—Copper-plate printing machine.

[1668]

MUIR, WILLIAM, & Co., *Britannia Works, Manchester*.—Machine tools. (See pages 71 to 73.)

[1669]

NAPIER, DAVID, & SON, 5 *Vine Street, and 51 York Road, Lambeth*.—Letter-press printing machine; machine for forming rifle bullets from cold lead by compression.

[1670]

NASMYTH, JAMES, & Co., *Bridgewater Foundry, Patricroft, near Manchester*.—Differential dividing, punching, and other machines; steam hammers, &c.

[1671]

NASH, R., *Ludgate Hill Passage, Birmingham*.—Presses, lathes, dies, tools, &c.

[1672]

NAYLOR, THOMAS, *Rainhill, near Prescott*.—All kinds of graving tools and broaches.

[1673]

NEILSON, WALTER MONTGOMERIE, *Hyde Park Foundry, Glasgow*.—Radial steam hammer, called a "steam smith."

MUIR, WILLIAM, & Co., *Britannia Works, Manchester*—Machine tools.

Prize Medal awarded at the Exhibition of 1851 ; Prize Medal awarded at the Paris Universal Exposition, 1855 ; Prize Medal awarded from the Society of Arts, 1855.

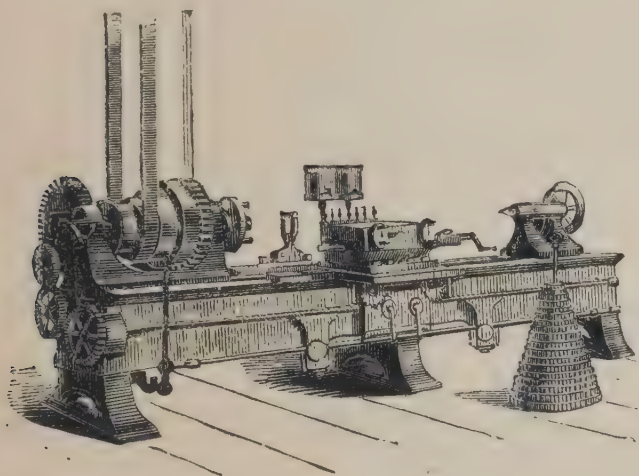


Fig. 1 —CENTRE DUPLEX LATHE.

Fig. 1. MUIR'S SELF-ACTING 12-IN. CENTRE DUPLEX LATHE for sliding and screw cutting. Double-gear headstocks, with wrought-iron steeled mandrel, running in hardened cast-steel conical bearings, guide screw full length of bed, with patent self-acting screw bearers, bed 25 ft. long, with patent duplex slide, carriages with clamp nuts by eccentric, rack and pinion for quick return by hand, the slide rests have two releasing motions for drawing back to tool slides. There is also a new reversing motion for changing from right to left hand, screw cutting, without changing the wheels, of which there are 22. Clements and common drivers, face-plate, backstay, &c. &c. This lathe is specially adapted for cutting screws expeditiously, and for sliding shafting at once going over.

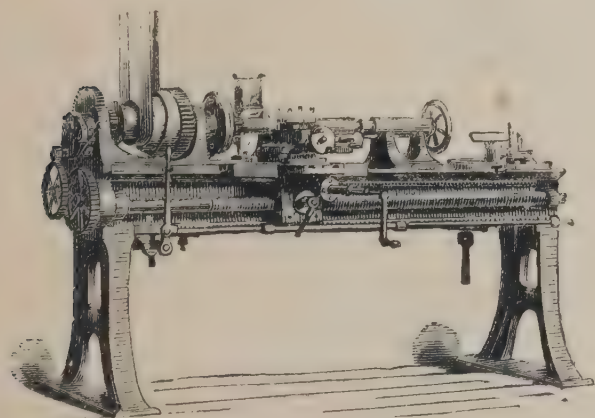


Fig. 2.—CENTRE DOUBLE-GEARED LATHE.

Fig. 2. MUIR'S PATENT 7-IN. CENTRE DOUBLE-GEARED LATHE, for sliding and screw-cutting, wrought-iron steeled mandrel running in hardened cast-steel conical bearings, guide screw full length of bed, which is 6 ft. long, reversing motion to slide and cut screws right or left hand without changing the wheels, of which there are 22, eccentric to lock the cone pulley, eccentric back-shaft, the slide carriage has clamp nut by eccentric, rack and pinion for quick return by hand, releasing motion to tool slide, clements and common drivers, 14-in. face plate, centre chuck backstay, hand rest, &c.

Fig. 3. MUIR'S PATENT 8-IN. FOOT LATHE, with 2 treadles, for screw cutting. Designed particularly for use on board steam vessels, for repairs afloat, or for the colonies, where labour is cheap, as with an assistant a workman will be able to do as much work as with a steam-power lathe of the same capacity.

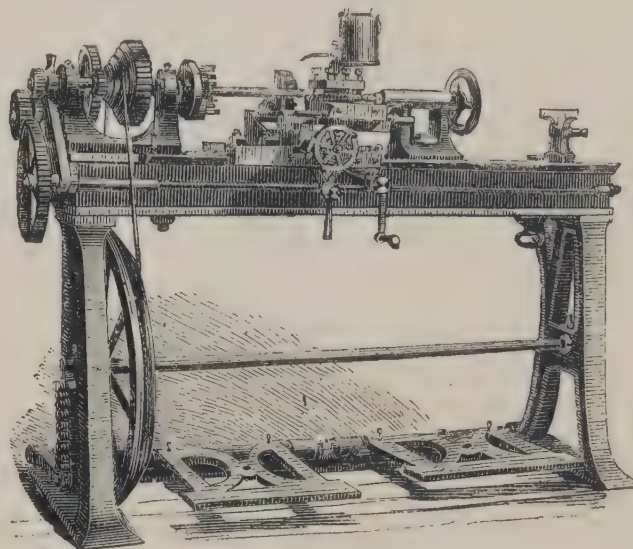


Fig. 3.—MUIR'S 8-IN. FOOT LATHE.

The same lathe is also fitted with four treadles for India, the wages of the natives being so low, it will in many places be found more economical than steam-power.

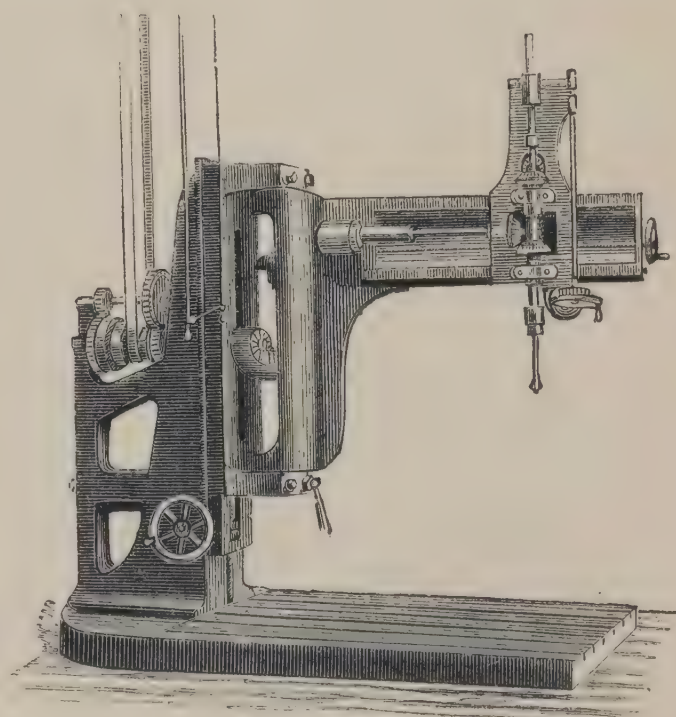


Fig. 4.—SELF-ACTING RADIAL DRILLING MACHINE.

Fig. 4. POWERFUL SELF-ACTING RADIAL DRILLING MACHINE, with vertical elevating slide radial arm, movable through an arc of 190°, to drill holes up to 10 in. diameter.

This machine is particularly adapted for drilling ends of boiler plates, large cylinders, and all work of a massive character, as it will take in an object 9 ft. high; all holes within range of the machine can be drilled without removing the object.

MUIR, WILLIAM, & Co., *continued.*

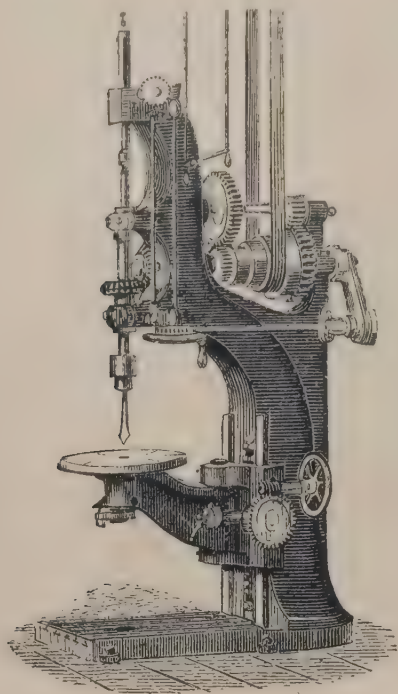


Fig. 5.—MUIR'S VERTICAL DOUBLE-GEARED DRILLING MACHINE.

Fig. 5. SELF-ACTING VERTICAL DOUBLE-GEARED DRILLING MACHINE, with circular revolving table on a radial bracket, which can be raised or lowered on a vertical slide by means of a worm wheel, so that when the work is once fixed a hole can be drilled on any part without moving it.

This drill is provided with a hardened steel locknut, which entirely prevents any backlash in the spindle.

SMALL BENCH DRILLING MACHINE, to drill to $\frac{3}{4}$ in. by hand or power.

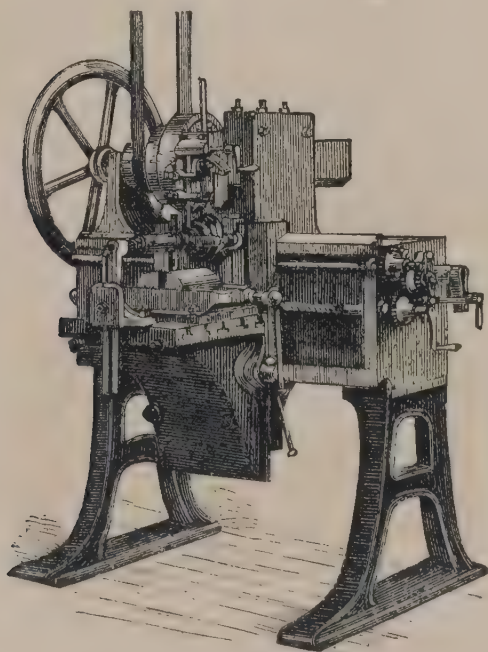


Fig. 6.—MUIR'S SELF-ACTING UNIVERSAL SHAPING MACHINE.

Fig. 6. SELF-ACTING UNIVERSAL SHAPING MACHINE, with a variable stroke from $\frac{1}{2}$ in. up to 6 in. Will plane an object 2 ft. long, circular work of 12 in. diameter, and can be changed to plane round, hollow, or flat surfaces, without refixing the article operated upon.

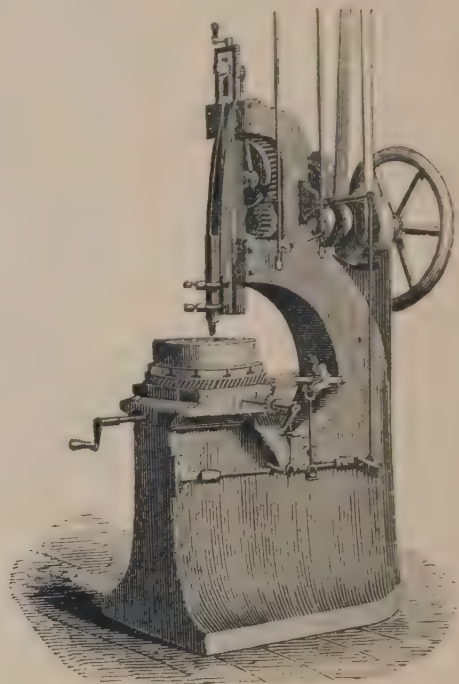


Fig. 7.—MUIR'S SELF-ACTING SLOTTING AND SHAPING MACHINE.

Fig. 7. SELF-ACTING SLOTTING AND SHAPING MACHINE, with a variable stroke up to 6 in. Will take in a wheel 3 ft. diameter, self-acting transverse and circular motions.

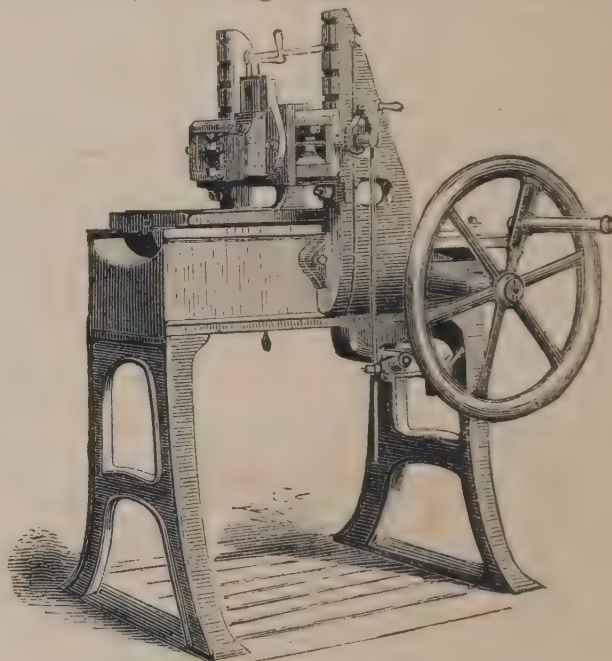


Fig. 8.—MUIR'S SMALL PLANING MACHINE.

Fig. 8. SMALL PLANING MACHINE, worked by hand or power, with crank movement and elliptical wheels for producing uniform motion in cutting, and treble speed in return of the table.

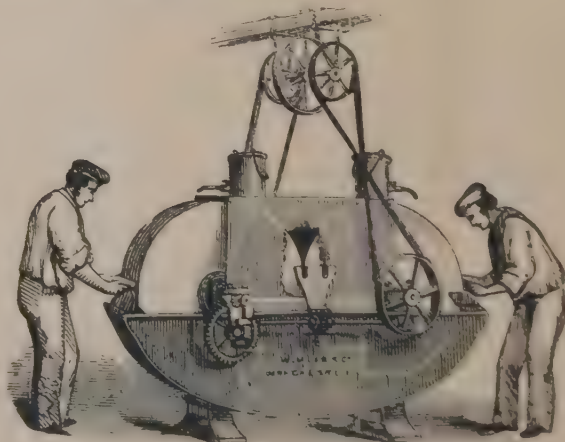


Fig. 9.—MUIR'S PATENT GRINDSTONE APPARATUS.

MUIR, WILLIAM, & Co., *continued.*

Fig. 9. MUIR'S PATENT GRINDSTONE APPARATUS for grinding edge tools. The stones are regulated by means of a right and left hand screw, and a lateral motion is given to one of them by means of a cam, thus enabling the workmen to grind their tools with a degree of accuracy hitherto impossible, and also doing

away with the great dust arising from turning-down stones, so injurious to the bearings of all machinery.

A prize medal was awarded for this machine at the Paris Exposition, 1855, and also by the Society of Arts during the same year.

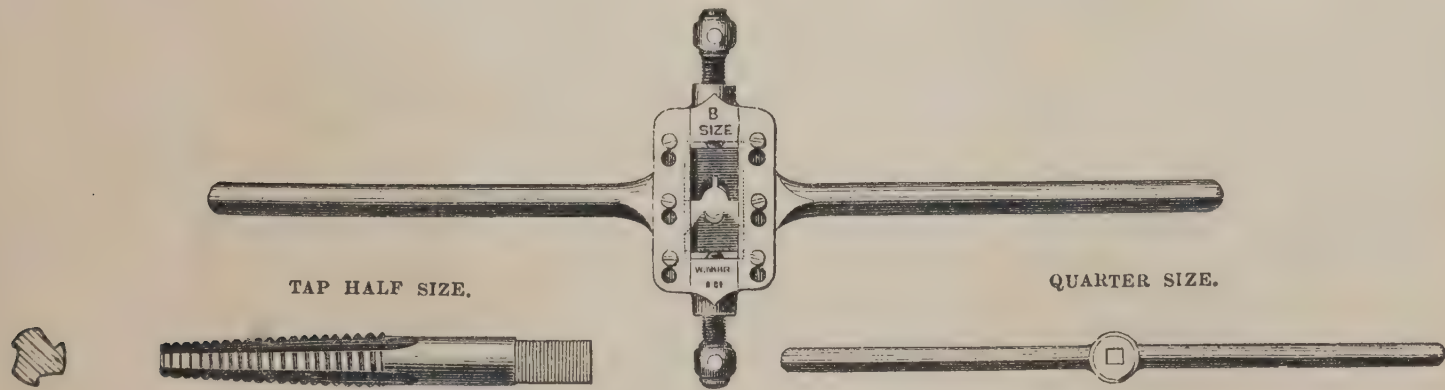


Fig. 10.—MUIR'S SCREW STOCK, AND SCREWING TACKLE.

Fig. 10. A COMPLETE SET OF IMPROVED SCREWING TACKLE.

The dies are made so that one will serve as a guide, and the other as a cutter, which can be sharpened on a grindstone. The taps are fluted in a superior form for cutting; the cutting edge is a radial line through section of tap, which is found by experience to take about one-third less power than taps that have

hitherto been in use; they are made to standard gauges.

The angle of the thread is 55° for all diameters, rounded both at the top and bottom.



SECTION OF INCH TAP.

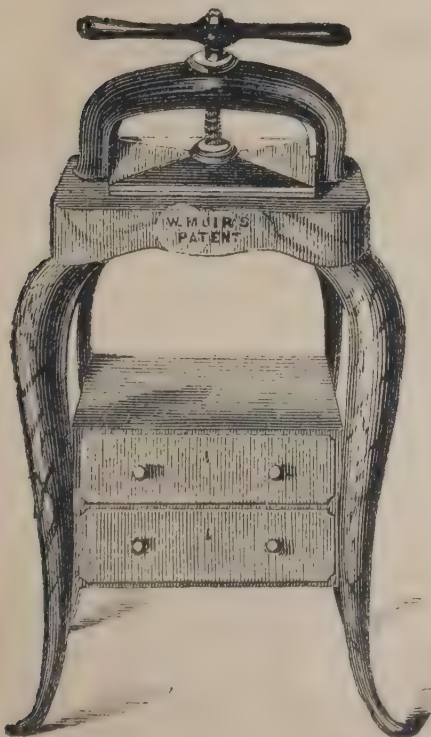


Fig. 11.—MUIR'S PATENT COPYING PRESS.

Fig. 11. MUIR'S PATENT COPYING PRESS, with stand and drawers.

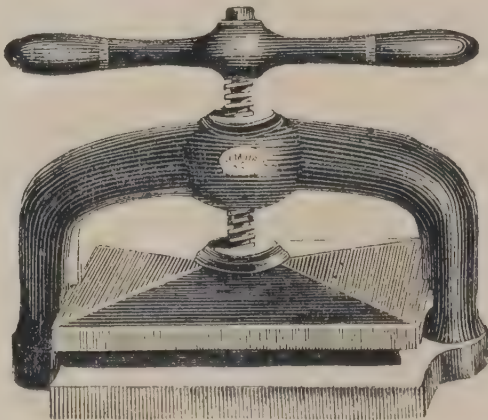
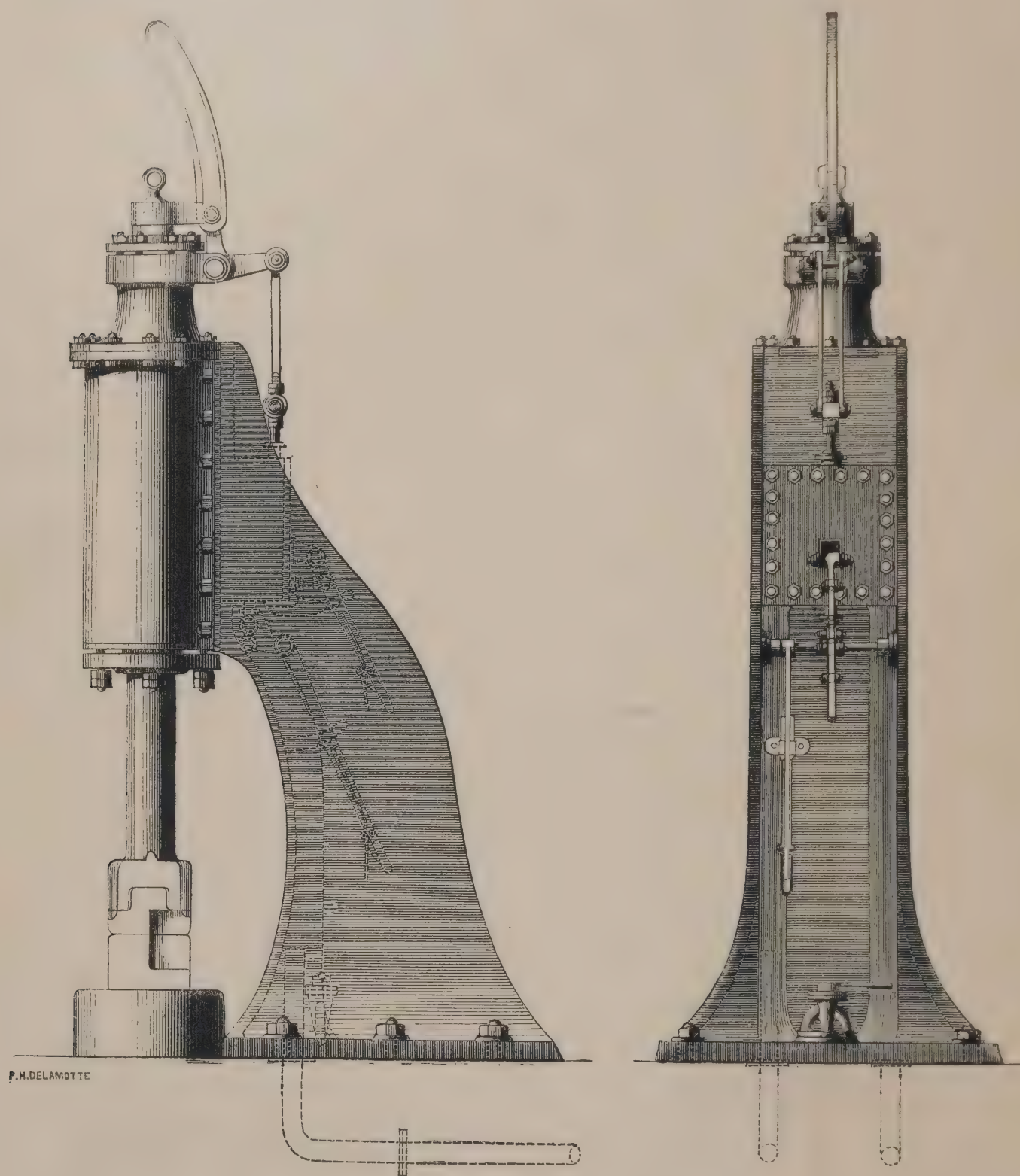


Fig. 12.—MUIR'S IMPROVED COPYING PRESS, QUARTO.

Fig. 12. MUIR'S IMPROVED COPYING PRESS, without stand. These presses are designed on the elliptic and screw principle; in quarto, foolscap, and folio sizes.

MORRISON, ROBERT, & Co., *Ouse Burn Engine Works, Newcastle-upon-Tyne.*—Steam hammer, with piston and bar forged solid.



DOUBLE-ACTING STEAM FORGE HAMMER.

ROBERT MORRISON'S PATENT DOUBLE-ACTING STEAM FORGE HAMMER of 20 cwt. with hammer bar and piston forged solid together.

The hammer is in full operation.

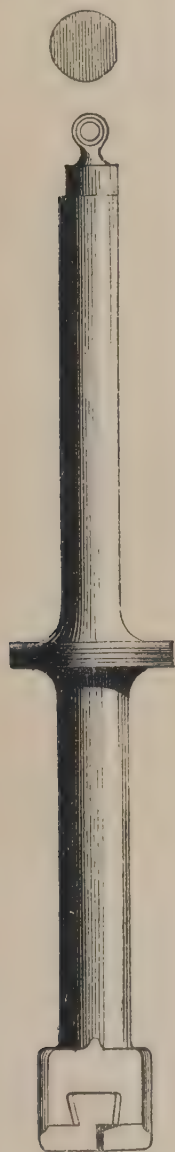
The above engraving shows a front and side elevation of a 20 cwt. double-acting forge hammer, and fully details the whole of the gear connected therewith. The steam cylinder is firmly bolted to the single frame, which is

made of a box form, the side of the box looking from the cylinder being omitted.

This frame also contains the steam chest, steam passages, steam and exhaust pipes, shown by the dotted lines in the engraving. The hammer bar, an engraving of which is given in the centre of the letter-press, is forged in one solid piece, with the piston and claw for holding the different faces required for various classes of work. Two small steel rings are inserted in grooves turned in the piston, and render it effectively steam tight without the

MORRISON, ROBERT, & Co., *continued.*

introduction of bolts, junk rings, or any additional parts calculated to destroy its solidity and simplicity. Above the piston the bar is planed flat on one side, a corresponding flat being left in the cylinder cover; this keeps the bar and the hammer face constantly in the same position relative to the anvil. On the top of the hammer bar there is a small roller which works in the slot of the slotted lever, shown attached to the cylinder cover; this lever, by means of a pair of links and a slide rod, gives motion to an ordinary box slide for admitting steam above and below the piston, and the slotted link is so shaped,



HAMMER BAR.

that equal spaces traversed by the bar at any portion of its stroke, produce correspondingly equal, though smaller motion in the slide. This slide once set requires no further alteration.

The larger of the handles is attached by links to a movable slide face, which can thereby be moved up and

down by hand, and regulate not only the length of the stroke but also its height from the anvil, according as the piece to be forged may happen to be thick or thin.

The smaller of the handles is attached to an ordinary stop valve, and is used for either shutting the steam off entirely, or so far reducing its pressure as to strike light blows for swaying or other purposes. The steam pipe from the boiler is fixed to the underside of the frame, and runs up some distance inside the bellmouthed part of the steam passage cast in the frame, which forms a trap for collecting any water that may accumulate in the pipes; a small cock placed at the bottom forms a communication between this tap and the exhaust passage, and can be opened at any time to carry off the water. A similar cock is placed higher up, which opens a communication from the bottom of the cylinder to the exhaust, for the purpose of getting rid of condensed water.

If at any time it should be required to strike a single blow, all that is necessary is to open the stop valve, and raise the lever attached to the movable face, and as the bar rises, suddenly depress it, when a single blow of any degree of intensity can be given, according as the stop valve is more or less open.

The foundation, anvil, and bed plate require no particular description, inasmuch as their form and size must depend on the nature of the ground and situation in which the hammer is required to be placed.

The momentum of the bar in rising and its impact with the forging in its descent, regulate the action of the valve to the greatest nicety. After the delivery of the blow, no more steam is admitted, and as it requires scarcely an eighth of an inch opening of slide to raise the bar while working with heavy blows on hot iron, the full force of the falling of the bar without any check from the steam below is obtained at the commencement, the reduction in thickness of the forging consequent on the blow being sufficient to open the slide to admit the requisite amount of steam to lift the bar, the momentum of which being unchecked in its upward course, opens the slide considerably more in that position, and admits the steam freely on the top of the piston, so that in all cases a very firm and powerful blow is obtained.

[1674]

NEWBERRY, RICHARD CHARLES, & CO., 4 & 5 *President Street West, Goswell Road, E.C.*—Patent enamelled cloth collars; machine for making the same.

MACHINE for the purpose of making ladies' and gentlemen's collars and cuffs from the patent enamelled cloth, stitched, and with button-holes, &c. complete at one operation.

[1675]

NEWTON WILSON, & CO., 144 *High Holborn, London.*—Sewing machines; and patent carpet sweepers. (*See pages 78 and 79.*)

[1677]

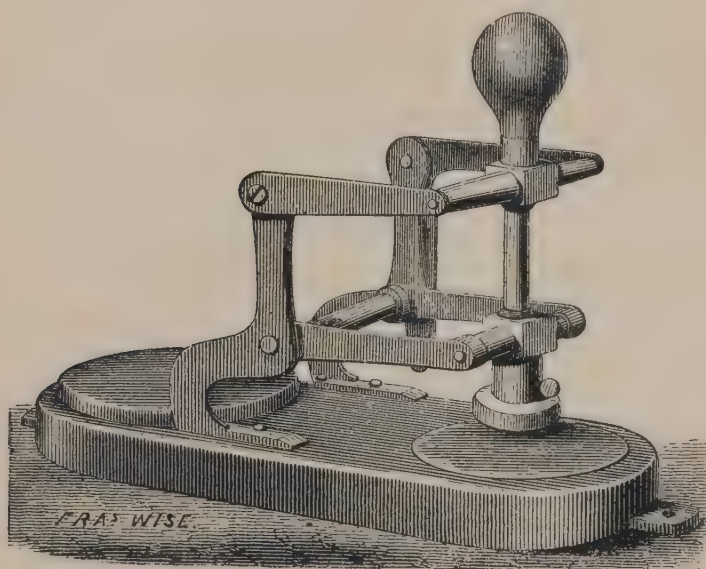
OATES, JOSEPH PIMLOTT, *Erdington, Birmingham.*—Photograph of machine for making solid bricks, immediately fit for firing.

[1678]

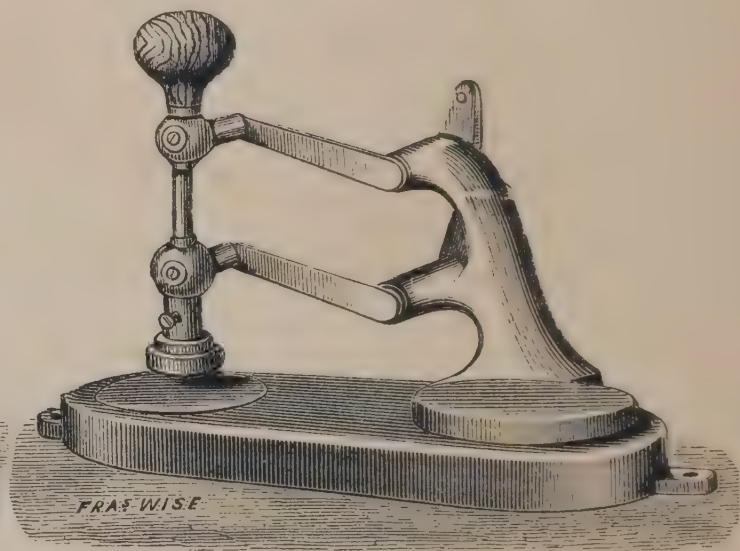
PAGE, E., & CO., *Victoria Iron Works, Bedford.*—Brick and pipe machinery.

[1679]

PALMER, HENRY ROBINSON, 308 *Albany Road, London, S.*—Patent parallel-motion stamping, printing, endorsing, and paging machines.



ENDORSING AND STAMPING MACHINE,
DOUBLE FRAME.



ENDORSING AND STAMPING MACHINE,
SINGLE FRAME.

These machines as used by H. M. Government offices, are applicable for railway companies, bankers, and all firms using stamps for documents, tickets, &c.; also for clothiers, hotels, and any establishment requiring printing on textile fabrics with indelible or oil inks.

Prices, Double Frames.

No. 0	£1 6 0
No. 1	2 12 6

No. 2	£3 3 0
No. 3	3 15 0

Prices, Single Frames.

No. 0	£1 1 0
No. 1	1 15 0
No. 2	2 0 0
No. 3	2 7 6

[1680]

PARKER, W., & SONS, *Northampton.*—Boot and shoe making machine. (*See page 77.*)

[1681]

PATENT FILE MACHINE AND FILE MANUFACTURING COMPANY, THE, *Manchester.*—Self-acting machines for cutting files.

Two of F. Preston's patent machines for cutting files.

[1682]

PEARSON, WILLIAM, & CO., *Leeds.*—Cut-nail machine for headed nails; also various sewing machines.

[1683]

PERRY, THOMAS, & SON, *Highfields, Bilston.*—Chilled or case-hardened rolls for rolling metals.

[1684]

PETO, BRASSEY, & BETTS, *Birkenhead.*—Drilling machine and machine for punching holes at one operation.

PARKER, W., & SONS, *Northampton*.—Boot and shoe making machine.

MACHINE FOR ATTACHING THE SOLES OF BOOTS AND SHOES BY MEANS OF SCREWS, &c. Secured by Her Majesty's royal letters patent.

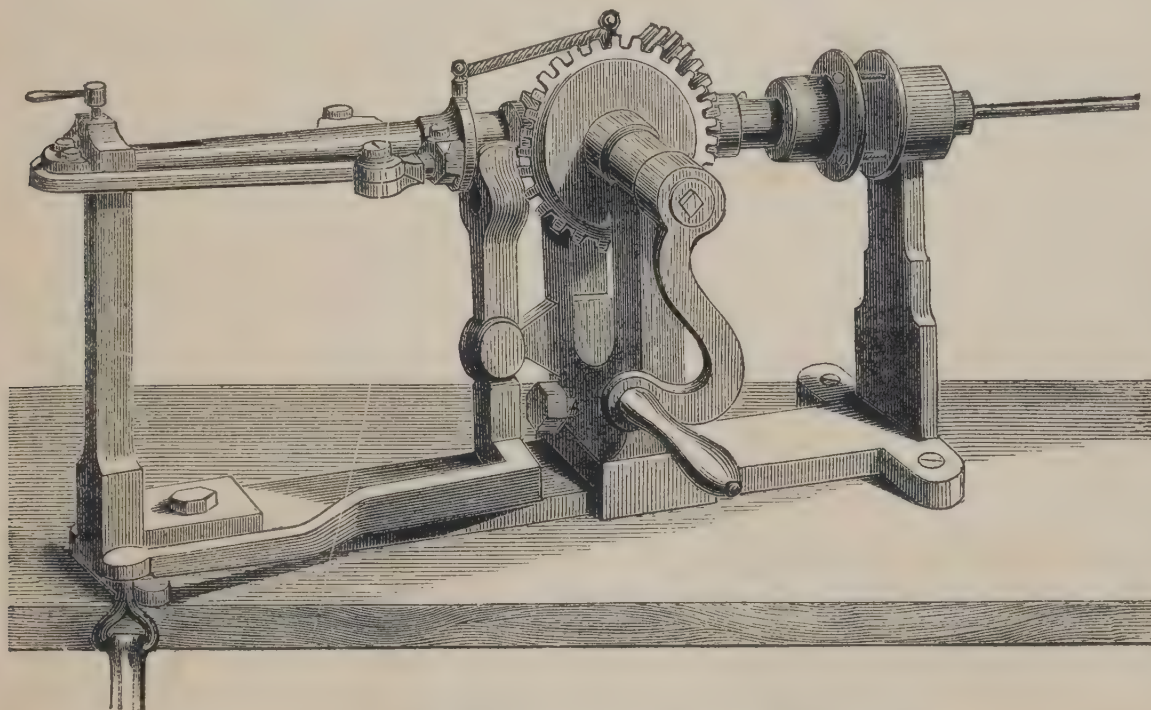
This simple and ingenious invention, from the facility and ease with which it can be worked, its portable construction, and the great saving of time and labour over the old system, cannot fail to recommend itself.

An inspection of it will fully convince the trade of its

great advantages, not only as to economy, but in general usefulness.

Each machine is manufactured under the supervision of the exhibitors by experienced workmen, and is thoroughly tested before being sent out.

It occupies a very small space, can be transported with perfect ease, and worked in any situation commanding sufficient light.



BOOT AND SHOE MAKING MACHINE.

The principal recommendations are—

Its entire simplicity—the use of it being acquired in a few hours by any boy of ordinary intelligence.

Its speed—being worked by hand, treadle, or steam power.

Its durability—being strong and fitted with mechanical precision, it remains in use for years without requiring repair of any kind.

The screw can be varied (by simply changing the die) to suit every description of work, from the lightest to the strongest.

Particulars can be obtained and the machine seen in constant use by applying to the exhibitors.

The proprietors are prepared to treat for the sale of this patent.

[1685]

PETTER & GALPIN, *Belle Sauvage Works, E.C.*—Printing machine. (*See pages 80 and 81.*)

[1686]

PINCHES, T. R., & Co., *27 Oxendon Street, Haymarket, S.W.*—Medal press.

[1687]

PORTER & Co., *Carlisle*.—Patent lozenge and biscuit machine.

[1688]

POWIS, JAMES, & Co., *Victoria Works, Blackfriars Road, London*.—Sawing and wood-cutting machinery and steam engines. (*See pages 82 and 83.*)

[1689]

PRENTIS & GARDNER, *Steam Engine and Paper Machine Works, Maidstone, Kent*.—Patent knotter or paper strainer.

[1690]

PRESTON, FRANCIS, & Co., *Manchester*.—Letter-copying machines; embossing presses; bankers' stamping machines.

[1691]

REYNOLDS, J. G., *33 Wharf Road, City Road, London*.—Machine for making tobacco-pipes.

NEWTON WILSON, & Co., 144 *High Holborn, London.*—Family and manufacturing sewing machines, and patent carpet sweepers. (Agents to the Grover and Baker Sewing Machine Company of Boston, U.S.A.)

The machines comprise the whole of the stitches at present known, of which the following are the leading:—

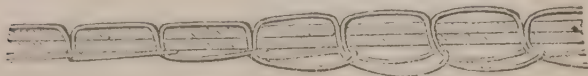


FIG. 1. CHAIN STITCH.

Fig. 1 represents the *chain stitch*, in which the loop is secured by the needle at the *succeeding* stitch, a part is left slack to illustrate this more clearly.

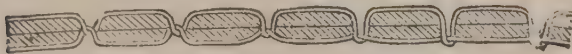


FIG. 2. LOCK STITCH.

Fig. 2 represents the *lock stitch*, in which the loop is secured by a shuttle carrying a second thread passing through it, the right extremity showing its appearance on hard and glazed fabrics; the left on thick and soft fabrics.



FIG. 3. KNOTTED STITCH.

Fig. 3 represents the *knotted stitch*, in which the loop is secured by an instrument carrying a second thread which enters the needle loop, leaving its own loop there, this second loop is then held open till the needle at its next descent enters it and the two loops are then drawn tight together. Fig. 3 shows the character of this stitch, and how securely even the last stitch is fastened by the action of the machine itself.

1. A LARGE MANUFACTURING MACHINE of the last-described stitch, suitable for sewing artisan clothing, tents, &c. Price, complete, with stand . . . £15 15
In N. W. & Co.'s Catalogue, see Nos. 2 and 28.
2. MEDIUM-SIZE MACHINE, suitable for corsets, cloth caps, and upholstering. Price . . . £13 13
See Nos. 3 and 27.
3. MANUFACTURING MACHINE, LOCK STITCH, for tailors, shoe makers, and stay makers. Price . . . £10 10
See No. 5 in N. W. & Co.'s Catalogue.

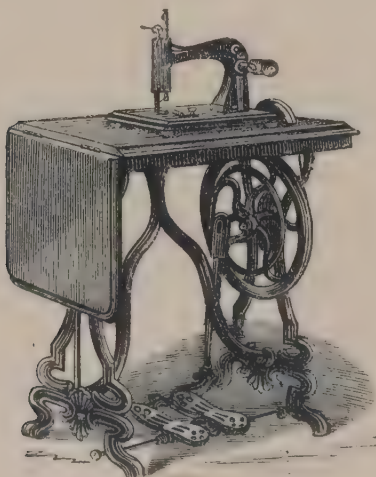


FIG. 4. LOCK-STITCH MACHINE.

4. NEW STYLE MANUFACTURING LOCK-STITCH MACHINE, possessing the following features:—Great range of work, fine or coarse, simplicity, strength, durability, speed, quietness; adapted particularly to tailoring, boot making, and all trades where a great variety of work is done. Prices . . . £13 13s. and £14 14
5. EXTRA LARGE MANUFACTURING LOCK-STITCH MACHINE for heavy work, such as leather traces, harness work. Price . . . £18 18
6. SMALL LIGHT MANUFACTURING LOCK-STITCH MACHINE, new style, for shirt and collar work, &c. &c. Price . . . £7 7s. and £9 9
7. EMBROIDERING MACHINE, making two lines of sewing at one time, and forming a magnificent embroidery. Price . . . £16 16
8. HERRING-BONE MACHINE, for making the stitch known as the herring bone, but capable of plain work also. Price . . . £20 0
9. BUTTON-HOLE MACHINE for tailors—all the button-hole apparatus removable for adaptation to general work. Price . . . £25 0
10. FINE BUTTON-HOLE MACHINE for shirt work, &c. Price . . . £20 0
11. MACHINE FOR DARNING STOCKINGS, constructed to repair the damaged parts with new knitting instead of hard darning. Price . . . £15 15
- Small ditto for family use . . . £2 10

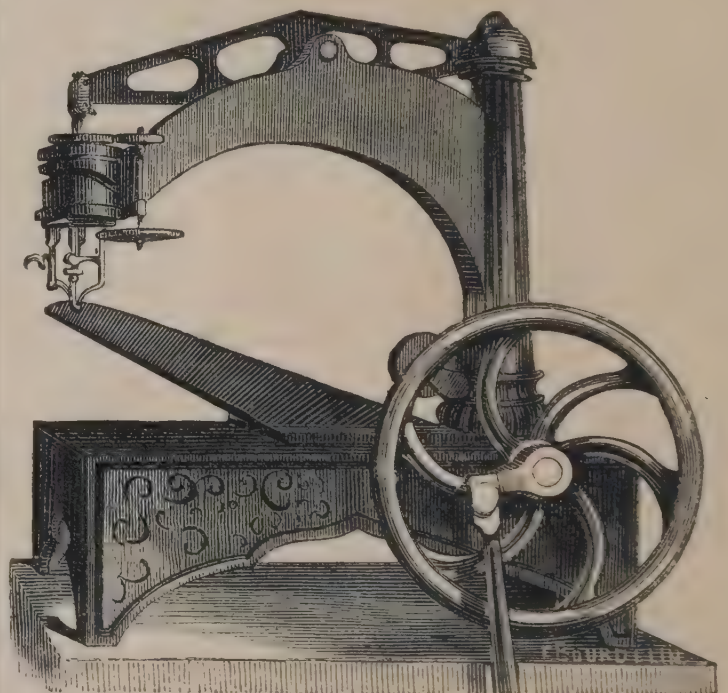


FIG. 4.

MACHINE FOR STITCHING SHOE SOLES ON TO THE UPPERS.

12. The MACHINE represented in fig. 5 for stitching shoe soles on to the uppers without the intervention of welts. The machine uses a waxed thread, making a perfectly flat seam, and completing the sewing of a pair of boots in three minutes.

This machine will be exhibited in operation in the Exhibition at a particular hour each day. The time may be ascertained from the attendants.

NEWTON WILSON, & Co., *continued.*

NEWTON WILSON, AND CO.'S FAMILY MACHINES.



FIG. 6. MEDIUM-SIZE KNOTTED-STITCH MACHINE.



FIG. 7. KNOTTED-STITCH MACHINE.

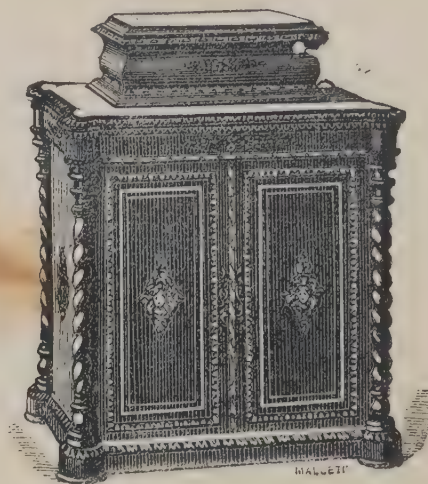


FIG. 8. CABINET AND MACHINE.

13. Fig. 6 represents a MEDIUM SIZE AND QUALITY KNOTTED-STITCH MACHINE, suitable for families and dressmakers, combining simplicity, speed, lightness, quietness, and great range of application, with the most perfect elasticity of stitch £11 11
14. LOCK-STITCH MACHINE, to fit the same stand as the last, and in same style £11 11
15. Fig. 7. Best style KNOTTED-STITCH FAMILY MACHINE,

on very elegant table and stand. Price, 16 to 20 guineas.

16. Fig. 8. Magnificent CABINET, in buhl and gold, with best machine.
17. New style FAMILY LOCK-STITCH MACHINE, highest finish.
18. New style FAMILY KNOTTED-STITCH MACHINE, highest finish.

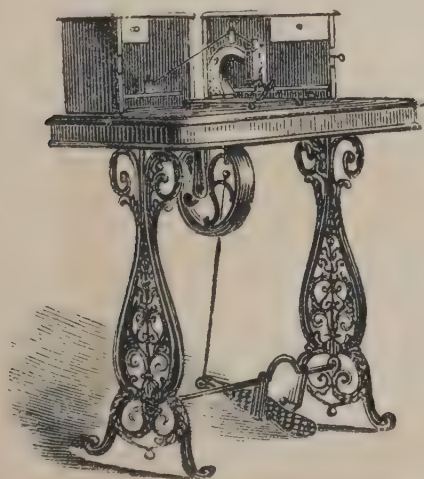


FIG. 9. BOUDOIR MACHINE.

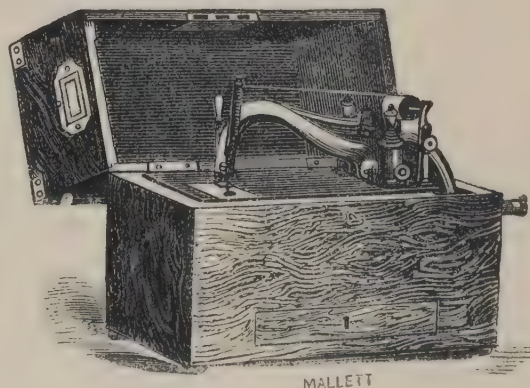


FIG. 10. MACHINE IN WORK-BOX.

19. Fig. 9. BOUDOIR MACHINE, knotted-stitch, runs both ways, machine detaches from driving arrangements by the act of closing. Price £14 14
20. Fig. 10. MACHINE IN WORKBOX—a form perfectly portable and compact for travelling or exportation, knotted stitch. Price, £12 12s. to £14 14
21. MACHINE FOR LIGHT WORK, chain stitch, including stand £5 5
22. Series of GUIDES and APPARATUS for facilitating the operations of the different machines, comprising hemming, felling, tucking, binding, cording, embroidering, and braiding above and below, or both at the same moment. The whole of these results being produced by machines Nos. 13, 15, 16, 18.
23. TABLEAU, showing the different operations of a single machine, knotted stitch. The whole of the work forming this magnificent tableau has been executed by machine No. 24 in Newton Wilson, and Co.'s catalogue (see fig. 6).

24. Three magnificent WAX MODELS of children, boy, girl, and infant, dressed in garments made entirely by these sewing machines, the infant seated in Messrs. Newton Wilson, & Co.'s patent chair.
25. Sample garments of different kinds, in show case, illustrating the application of the different machines.
26. PATENT CARPET SWEEPER, taking up the dust, &c. from carpets without damping, kneeling, or dusting. Applicable to all kinds of carpets. Price . 12s. 6d.
27. Carpet sweeper, with self-adjusting arrangement to brush. Price 15s. 0d.
28. Carpet sweeper, larger size ditto. Price . 20s. 0d.
29. Carpet sweeper, noiseless in action, for sick rooms. Price 18s. 0d.
30. Carpet sweeper, large size, ditto. Price . 24s. 0d.
- The brushes can be renewed at the cost of ordinary brooms.

PETTER & GALPIN, *Belle Sauvage Works, E.C.*—Printing machine.

PETTER AND GALPIN'S DOUBLE PATENT NOISELESS "BELLE SAUVAGE" PRINTING MACHINE, as supplied to Her Majesty's Government, with S. BREMNER'S patented improvements, new design and registered framework; the simplest and best news, book, and general jobbing machine of the day, adapted to foot, hand, or steam power.

Messrs. Petter and Galpin's patent "BELLE SAUVAGE" machine has been entirely remodelled (see accompanying engraving), and the whole of Mr. Bremner's recently patented improvements added, for which new patterns have been made to an original design, registered according to act of parliament. The utmost attention has been paid to every detail, so as to render the "Belle Sauvage" machine simple and strong in construction, noiseless in working, and light and easy to turn by hand, combining all the facility of the hand-press with superior productive powers, both as regards speed and economy. It is unquestionably the most perfect, useful, and easily worked machine ever introduced for newspapers, book-work, and first-class jobbing, ruled headings, broadsides, &c.; and the facility with which it can be changed from one class of work to another, together with the little attention it requires beyond that of an ordinary hand-press, renders it the desideratum of the jobbing office.

The machine occupies but little space, is highly finished, and though sufficiently light to admit of its being erected in a press-room, is strong, powerful, and well-built; its mechanical arrangements and working parts are exceedingly simple, free from unnecessary noise and friction, and may be easily understood by an ordinary pressman; it requires little or no making ready, and can be driven with ease by hand, or by steam power, at the rate of from 1,000 to 2,000 impressions per hour, according to size of machine, capacity of layer-on, and class of work required. A double-crown "Belle Sauvage" machine, size of one exhibited Class 7 B, occupies less working space than a double-crown press, will do 6 times the amount of work, and save 75 per cent. in cost and labour, thus clearly superseding the hand-press.

The improved reciprocating motion given to the carriage, by means of compound levers or beams placed immediately in the centre of the machine, connected to the printing-table by well-fitted horizontal parallel rods, imparts to it a perfectly steady and even movement, thereby materially lessening the noise and heavy bodily labour which usually attend the working of machines, and diminishing the liability to accident and stoppage; and attaining that firmness and rigidity so necessary to good printing.

The cylinder being made to rest while the white sheet is taken and the printed one delivered (printed side upwards), ample time is afforded to lay the sheet correctly up to the register gauge; when if, by accident, the sheet (through its being too damp, sticking together, or having the corners turned down) has not been laid up in time, the layer-on has it in his power to stop the cylinder, without stopping the machine, and so prevent the blanket from being inked. By this means also he is enabled, before printing the sheet, to ink the forme two or more times at pleasure, in cases of posters, or other heavy solid formes, where more than an ordinary charge of colour is required. The grippers take the sheet while the cylinder is at rest (a point essential to good register), by means of a patent improved horizontal register gauge, which is capable of being adjusted to any given margin, whereby the necessity for changing the position of the forme is entirely obviated. The register gauge is carefully arranged in front of the laying-on board, attached to the gripper-bar, and closes with the grippers, thus securing perfect register without points. The usual pointing apparatus, however, can be attached to the machine.

TESTIMONIALS.

ON HER MAJESTY'S SERVICE.

"Royal Laboratory, Woolwich Arsenal,
"4th April, 1862.

"GENTLEMEN,—In reply to your letter of the 3rd February last, asking for my opinion of the merits of the Patent 'Belle Sauvage' printing machine, I beg to say that the two machines of the above description in use in this department, one of which has been at work for fifteen months, have given entire satisfaction. Their simplicity and economy, added to their power of producing large quantities of work correctly and expeditiously, render them very valuable.

"I am, gentlemen, your obedient servant,
(Signed) "E. W. BOXER,
"Superintendent Royal Laboratory.

"Messrs. Petter and Galpin, Belle Sauvage Works,
Ludgate Hill, London, E.C."

FROM THE "DOVER EXPRESS," KENT.

"Express Office, Dover, Feb. 18th, 1862.

"GENTLEMEN,—I have much pleasure in informing you that the Improved Double Patent 'Belle Sauvage' Machine (Double Super-Royal) I have recently purchased of you answers in every respect, and to the fullest degree, my expectations. It works beautifully; runs with great ease; and may be said to work without noise, so little is there.

"The recent improvements, patented by Mr. BREMNER, and of which this machine affords an admirable specimen, are of the greatest service, especially to those who, like myself, have not been accustomed to machine work.

"I am, Gentlemen, yours truly,
(Signed) "JOSEPH T. FRIEND.

"Messrs. Petter and Galpin."

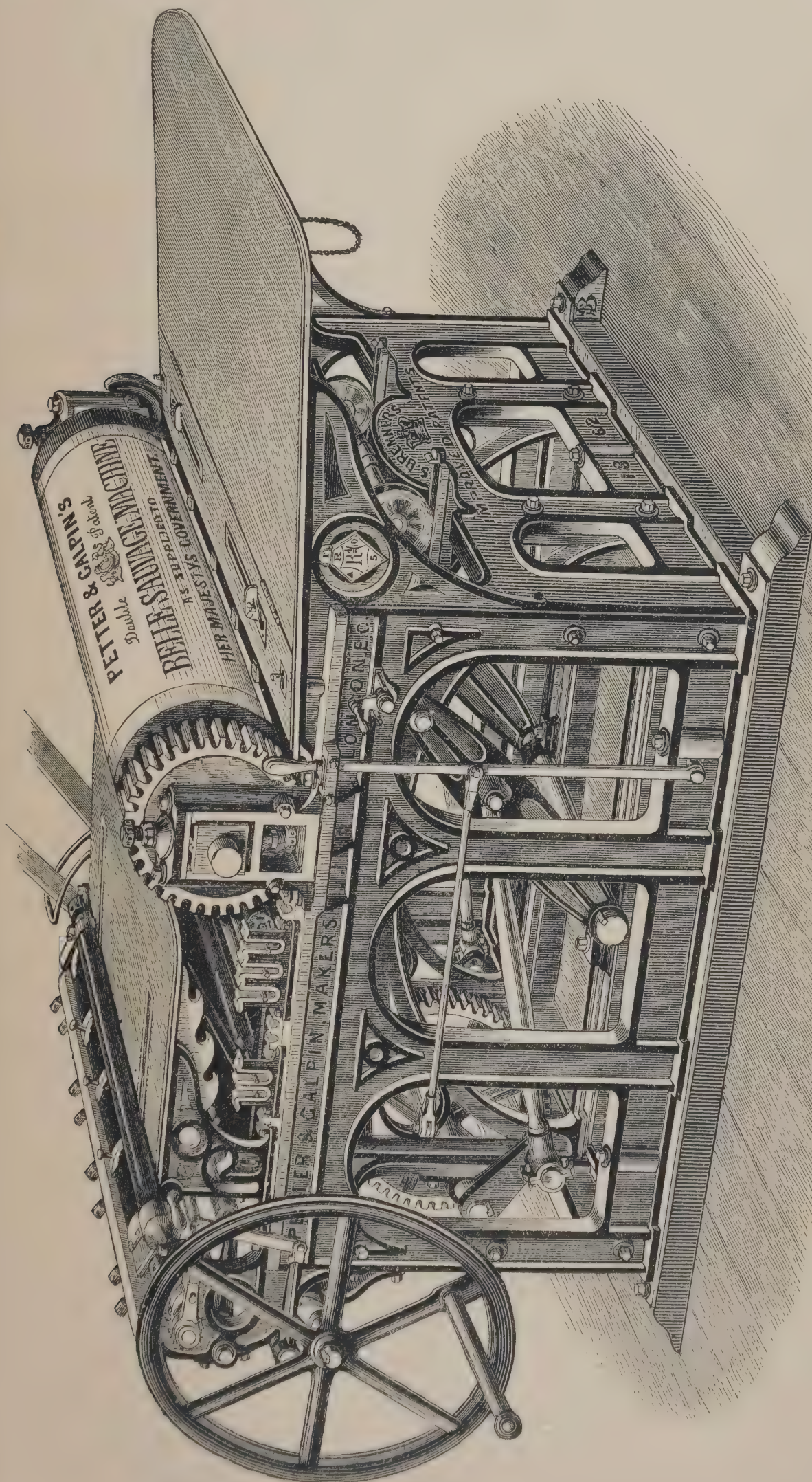
EXTRACTS FROM TESTIMONIALS.

"It is light and easy to turn by hand.... A boy has no difficulty in working it at the rate of 900 to 1,000 per hour.... It prints well, with rapidity and ease, good register being easily obtained.... We are perfectly satisfied with the admirable manner and ease with which she works.... For commercial work, I cannot speak of it in terms too favourable.... It works very easily; its register is perfect.... I can strongly recommend it, too, for its simplicity of construction, non-liability to get out of order, and easy working.... We work it by hand at about 1,000 per hour, but have worked it considerably above that rate.... A lad of 15 or 16 years of age can turn it without difficulty.... Just come out of the machine room (9.0 P.M.), leaving the "Belle Sauvage" (No. 5) working away to the tune of 1,000 an hour, apparently without any effort, and scarcely any noise can be heard; if you had to see it, I am sure you would be astounded.... Printers who are unacquainted with it in practice, can form no adequate idea of its usefulness."

Nearly 200 "Belle Sauvage" machines now in use.

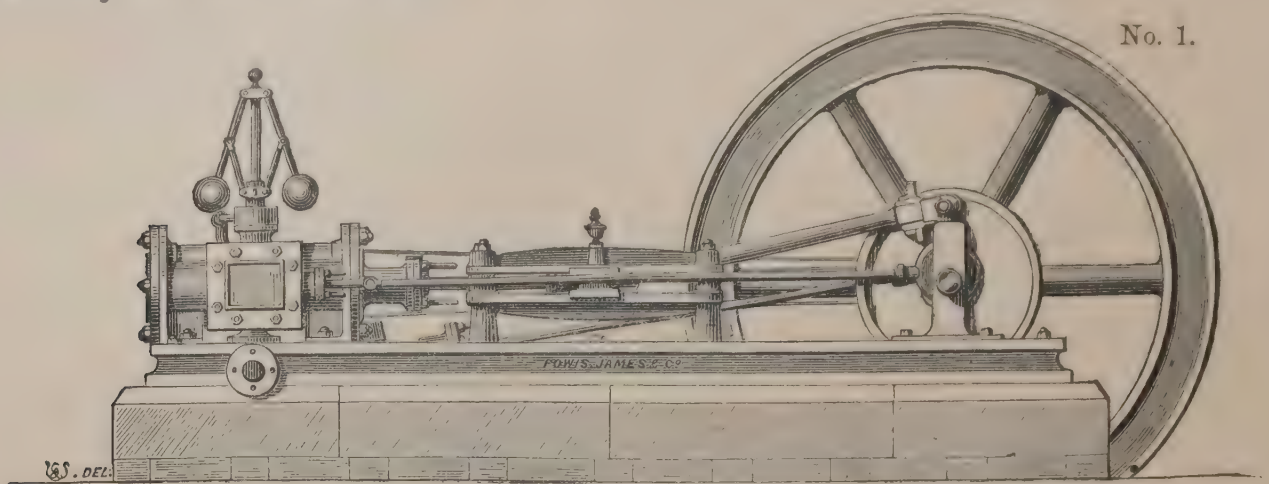
The machine may be viewed in operation, testimonials seen, references given, illustrated prospectuses, with sizes, prices, and full particulars of the machine obtained, upon application to the proprietors and sole manufacturers, Messrs. Petter and Galpin, Printers, Engineers, and Machinists, Belle Sauvage Works, Ludgate Hill, London, E.C., and at the Great International Exhibition.

PETTER & GALPIN, *continued.*



PETTER AND GALPIN'S DOUBLE PATENT "BELLE SAUVAGE" PRINTING MACHINE, WITH S. BREMNER'S PATENTED IMPROVEMENTS,
NEW DESIGN AND REGISTERED FRAMEWORK.

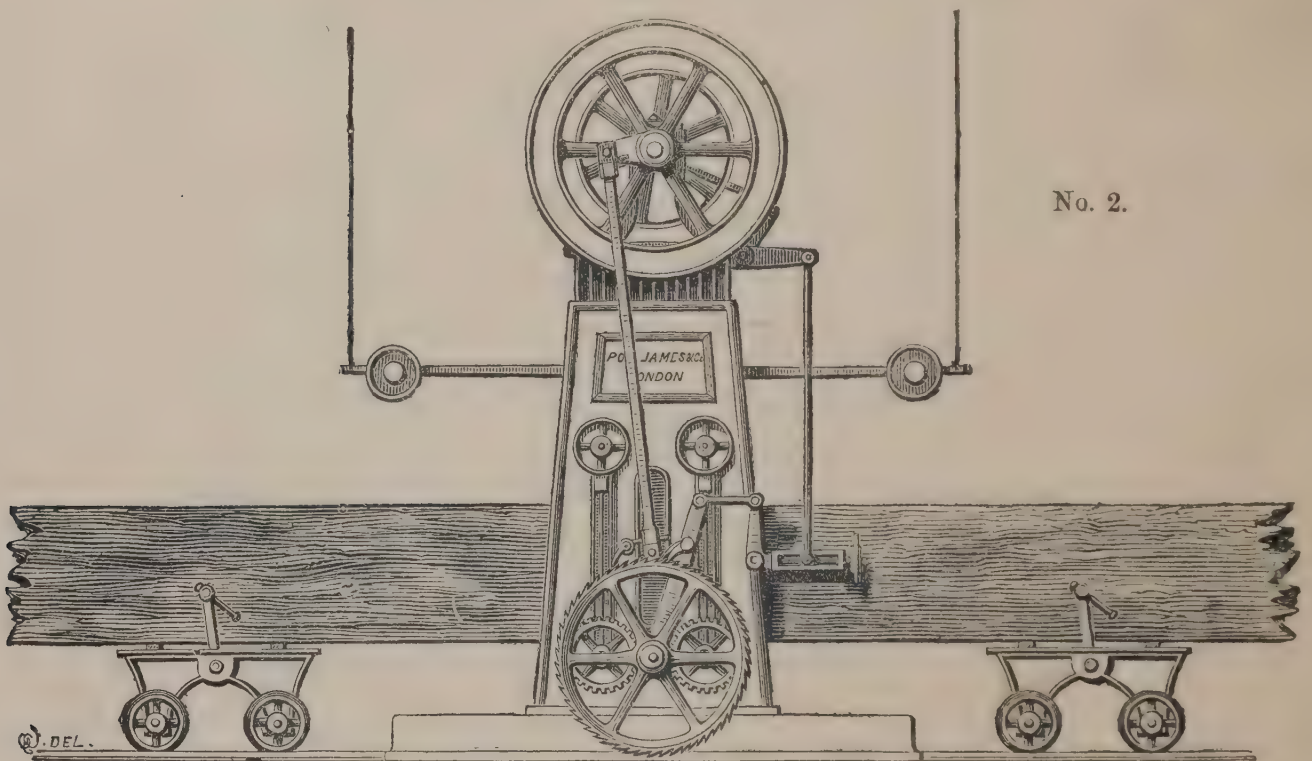
POWIS, JAMES, & CO., *Victoria Works, Blackfriars Road, London.*—Sawing and wood-cutting machinery and steam engines.



No. 1.

HORIZONTAL ENGINE.

No. 1. 6-horse power HORIZONTAL ENGINE, with all the recent improvements, combining compactness and extreme portability in case of removal.

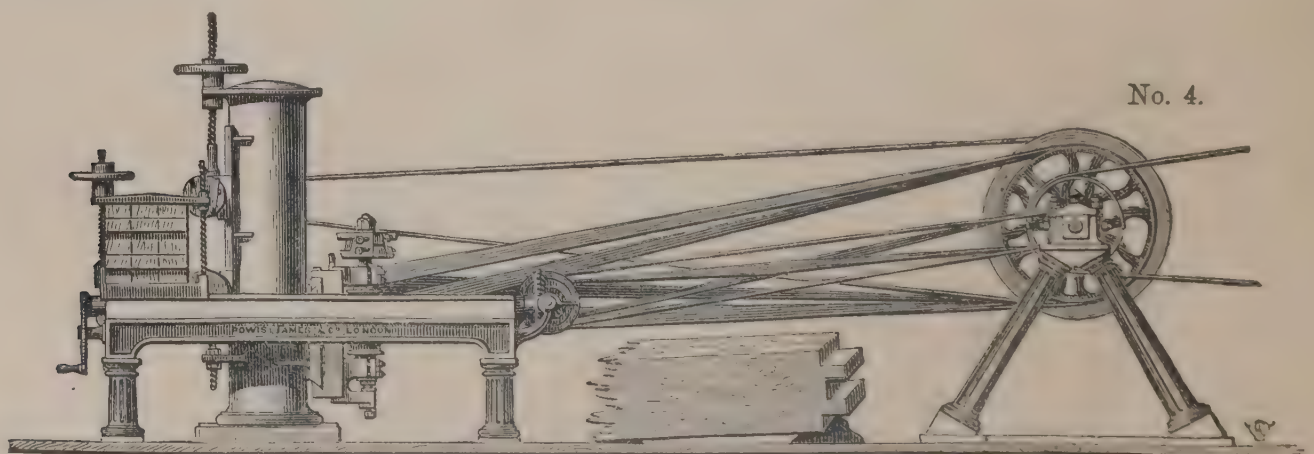


No. 2.

COMBINED TIMBER AND DEAL FRAME.

2. COMBINED TIMBER AND DEAL FRAME, for 24-in. logs, or two deals 24 by 7 in.

This is a small mill of itself, and one that no builder should be without.



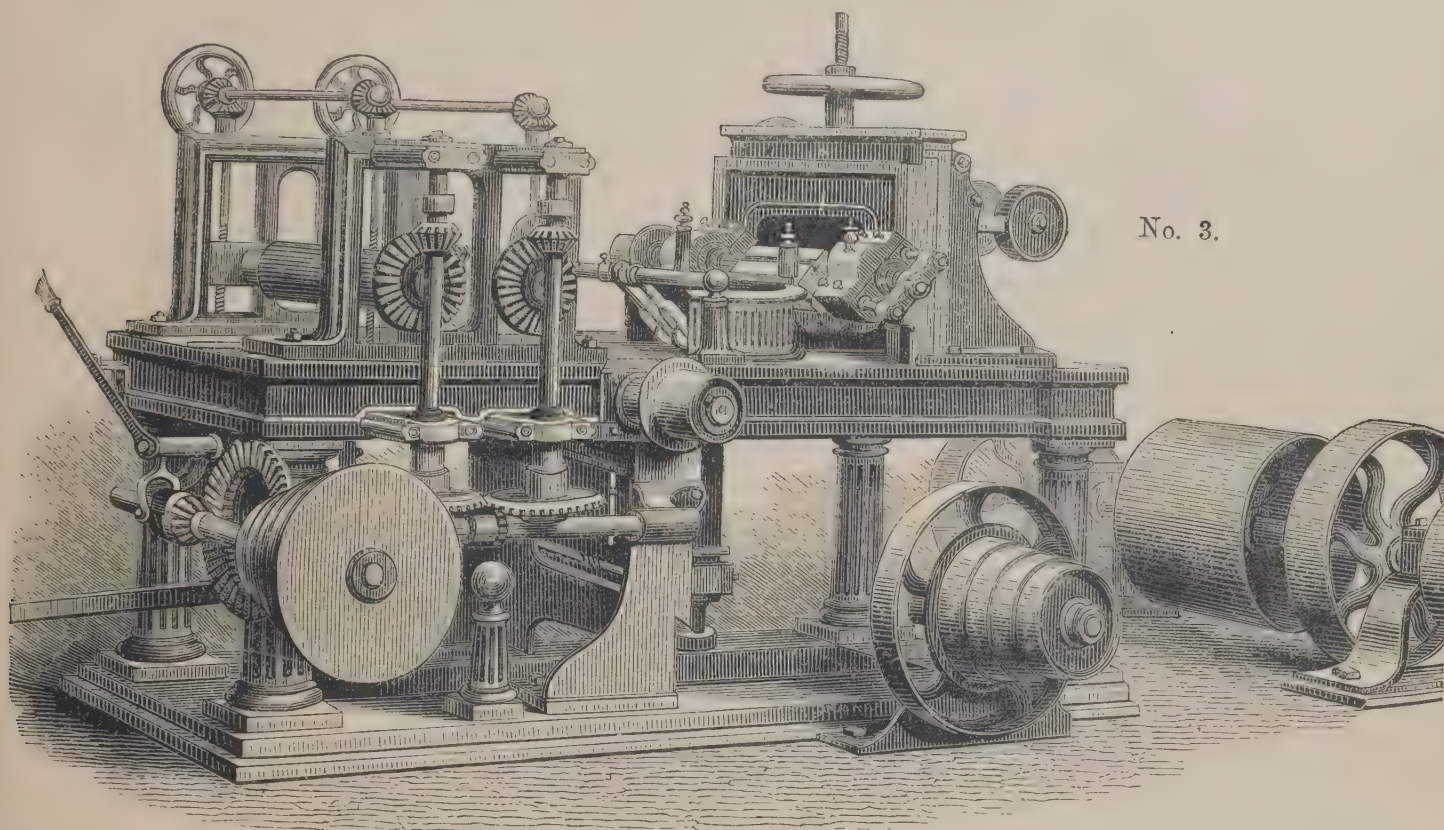
No. 4.

3. CONTRACTORS' AND BUILDERS' COMBINED MACHINE, for planing, moulding, and edging all four sides at one operation, any size under 12 in. wide by 6 in. thick.

4. Self-acting double or single TENONING MACHINE, for

railway-carriage framing. This machine operates on four waggon soles at once, and completes four tenons in half a minute from the time the cutter strikes the wood.

POWIS, JAMES, & Co., *continued.*



No. 3.

5. DOUBLE-DEAL FRAME, to cut 2 deals 14 by 4 in.

Most advantageous where mills are by the side of tidal rivers, as it is so constructed that no expensive or deep foundations are required.

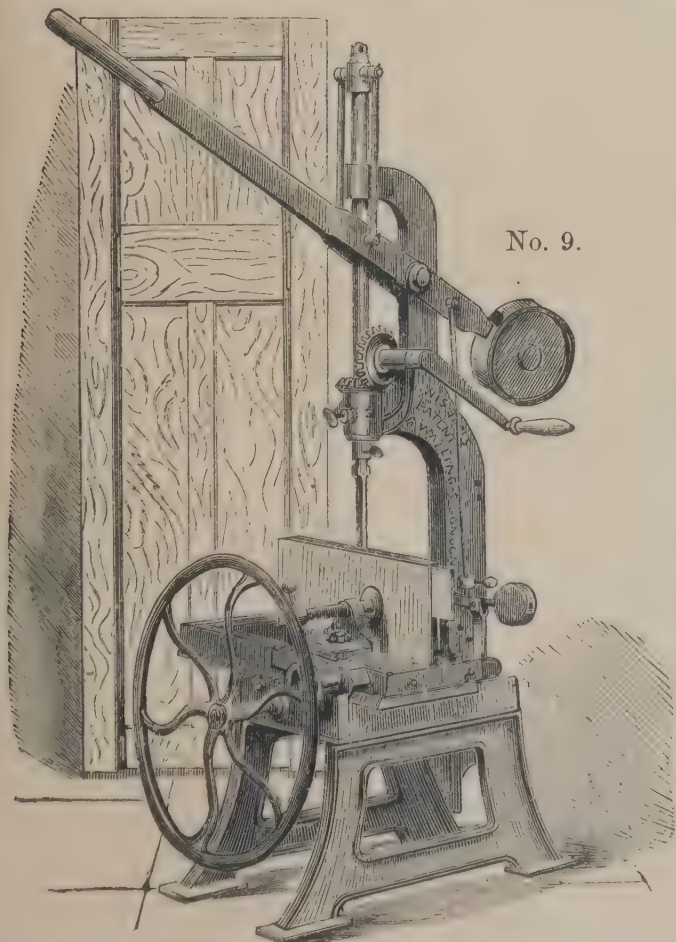
6. COMBINED MOULDING, THICKENING, AND SQUARING-UP MACHINE, for carriage framing, door styles, &c.

7. IMPROVED BAND SAWING MACHINE, with Powis,

James, & Co.'s patented adjustment for regulating the tension of saws, thereby preventing breakage.

8. SELF-ACTING CIRCULAR SAW BENCH, capable of breaking up logs 20 in. diameter, or cutting deals; made with or without bogies.

An excellent machine for colonists, where strength and portability are required.



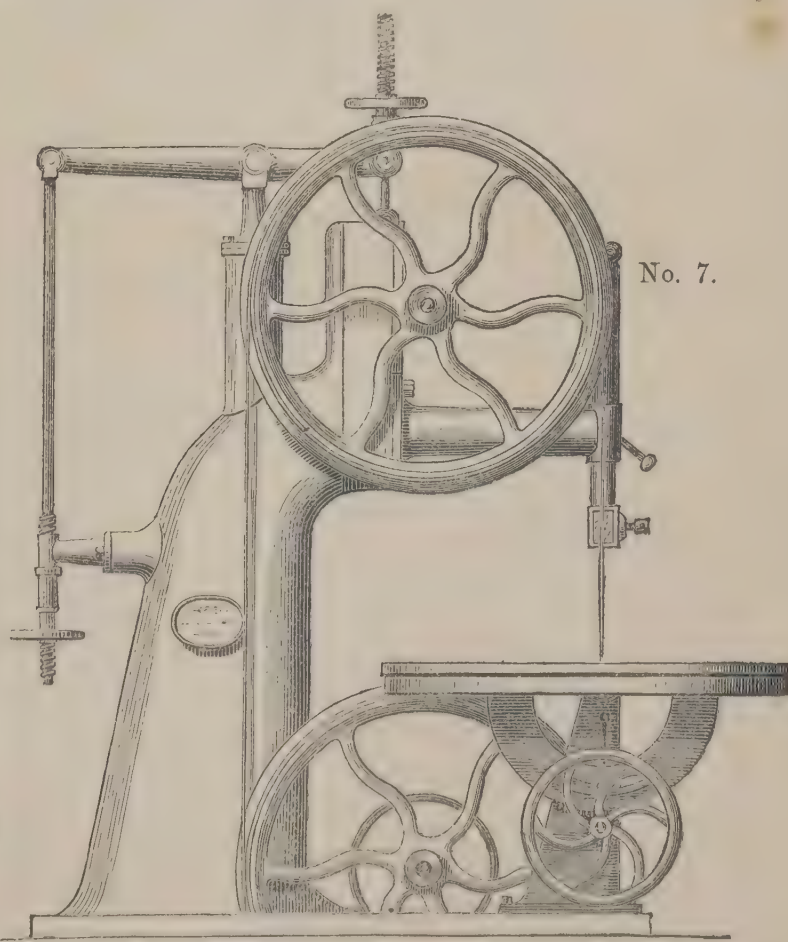
No. 9.

9. PATENT COMBINED MORTISING, TENONING, AND BORING MACHINE, for hard or soft wood.

This compact, strong, and useful tool is capable of doing the work of eight men. As a proof of its appreciation, three thousand are now in use.

10. MULTUM IN PARVO, or the general joiner.

This machine will saw, plough, groove, rebate, thickness, bore, cross-cut, and strike mouldings.



No. 7.

11. IMPROVED TENONING MACHINE, for joiners and the small work of railway-carriage builders.

12. STEAM MORTISING MACHINE, for joiners and railway shops.

The exhibitors are patentees and manufacturers of all kinds of wood-cutting and sawing machinery, portable and fixed steam engines, &c.

All letters and applications for drawings and prices should be addressed 26, Watling Street, E.C.

[1692]

RHODES, JOSEPH, *Hope Foundry, Morley, near Leeds.*—Patent rag machine.

The exhibitor is a manufacturer of woollen machinery, slubbing horses, piecing machines, tenterhook teasers, shake woolleys, ragshakers, shoddy and mungo machines. He is also the sole maker of a patent improvement

applicable to mungo machines, for freeing the mungo from bits of cloth, one of which is attached to the machine now exhibited.

[1693]

RHODES, JOSEPH, *Grove Works, Wakefield.*—Steam hammer; punching and shearing machine.

[1694]

ROBERTS, RICHARD, & Co., 10 *Adam Street, Adelphi.*—Drawings of iacquard punching machine, and angle-iron punching machine.

[1695]

ROBINSON, THOMAS, & SON, *Rochdale.*—Sawing, planing, moulding, mortising, tenoning, and sharpening machines for working wood. (*See page 88.*)

[1696]

ROSS, JOHN, *Leith.*—Double-cylinder printing machine, with self-acting set-off sheet apparatus.

[1697]

RYDER, WILLIAM, *Bolton, Lancashire.*—Ryder's forging machine for rollers, spindles, bolts, studs, &c.; patent machine for fluting rollers for cotton machinery.

[1698]

SALISBURY, S. C., *Coventry.*—Patent knot-stitch sewing machine, simple, durable, and cheap.

[1699]

SEGGIE, ALEXANDER, *Edinburgh.*—Lithographic press for finest work, can be wrought by hand or steam power.

[1700]

SERVICE, WILLIAM, *Mitcham, Surrey.*—Sewing machines with double-feed action.

[1701]

SHANKS & Co., 6 *Robert Street, Adelphi.*—Manifold drilling machine; mortising drilling machine; frictional guard drilling machine; steam hammer; shaping machine.

[1702]

SHARP & BULMER, *Middlesbro'.*—Little Wonder hand brick or tile machine; 5,000 bricks per day.

[1703]

SHARP, STEWART, & Co., *Atlas Works, Manchester.*—Workshop tools, wheel lathe, Giffard's injectors for feeding steam boilers. (*See pages 86 and 87.*)

[1704]

SHARRATT & NEWTH, *Clerkenwell.*—Glaziers' diamonds.

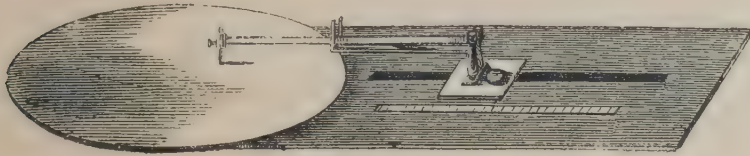


MACHINE FOR CUTTING OVALS.

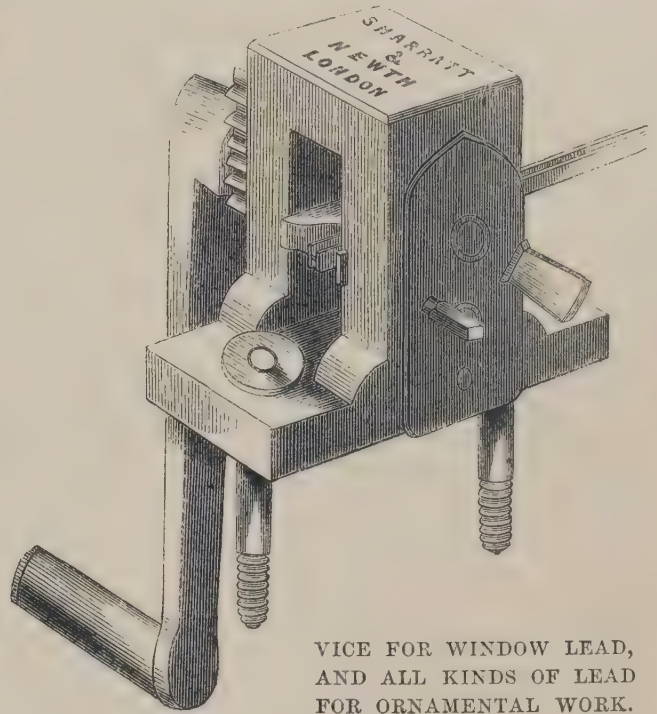


BEAM COMPASS FOR CIRCLES.

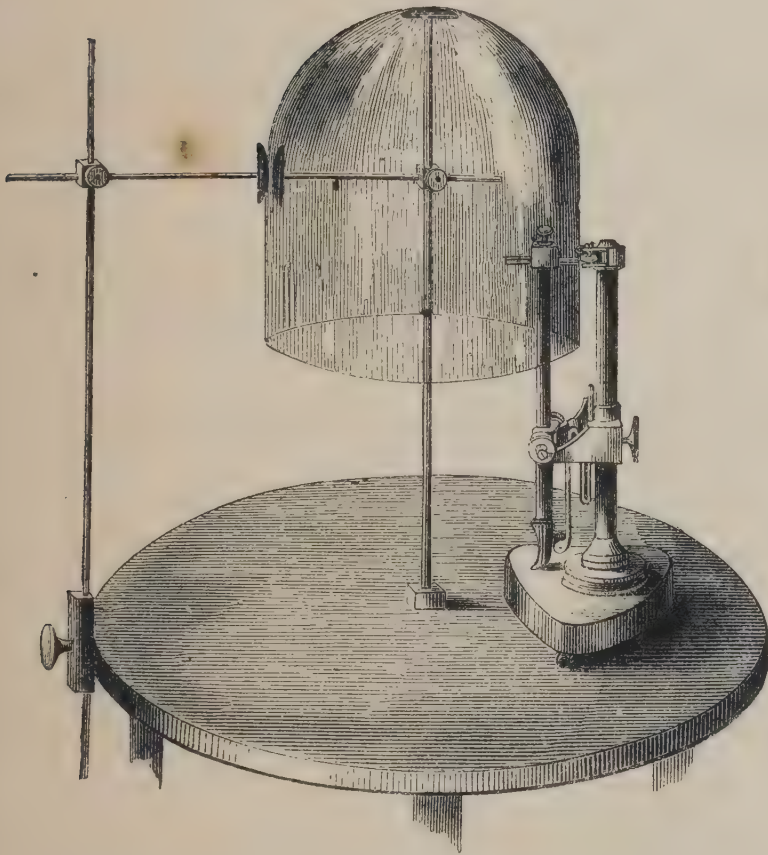
SHARRATT & NEWTH, *continued.*



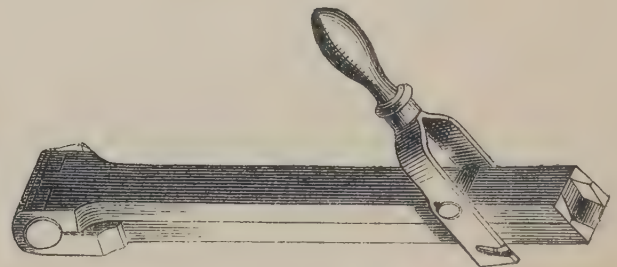
MACHINE FOR CUTTING CIRCLES.



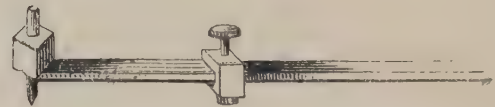
VICE FOR WINDOW LEAD,
AND ALL KINDS OF LEAD
FOR ORNAMENTAL WORK.



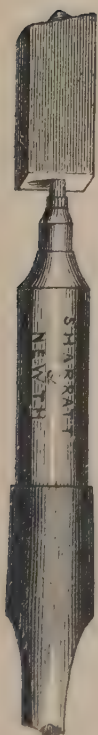
MACHINE FOR CUTTING ROUND AND SQUARE SHADES,
WITH TABLE AND FIXING APPARATUS.



MOULDS FOR CASTING LEAD.



GAUGE DIAMOND FOR SHADES.



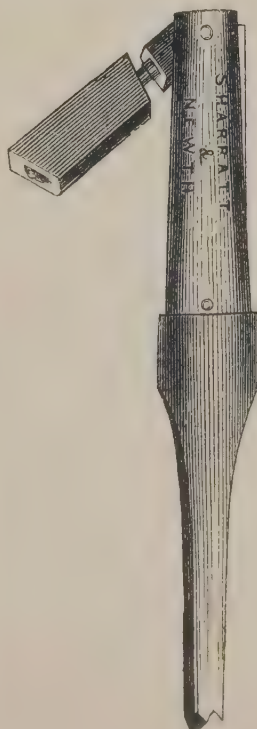
ORDINARY DIAMOND.



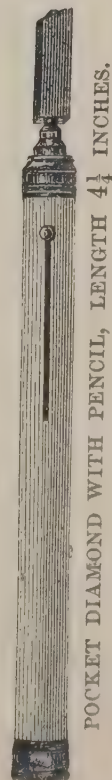
SAME WITH RACK.



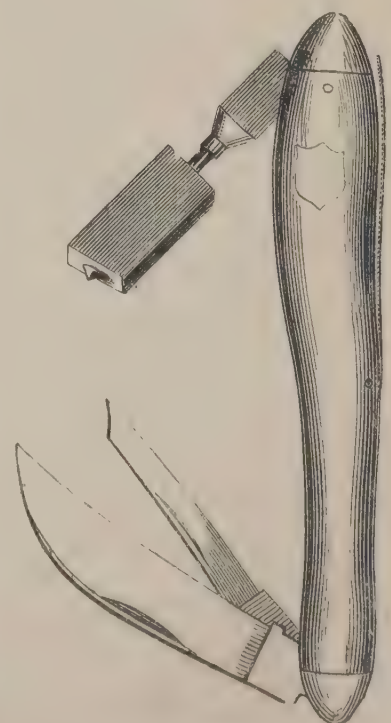
DIAMOND MOUNTED IN SILVER WITH IVORY HANDLE.



DIAMOND TO SHUT UP.

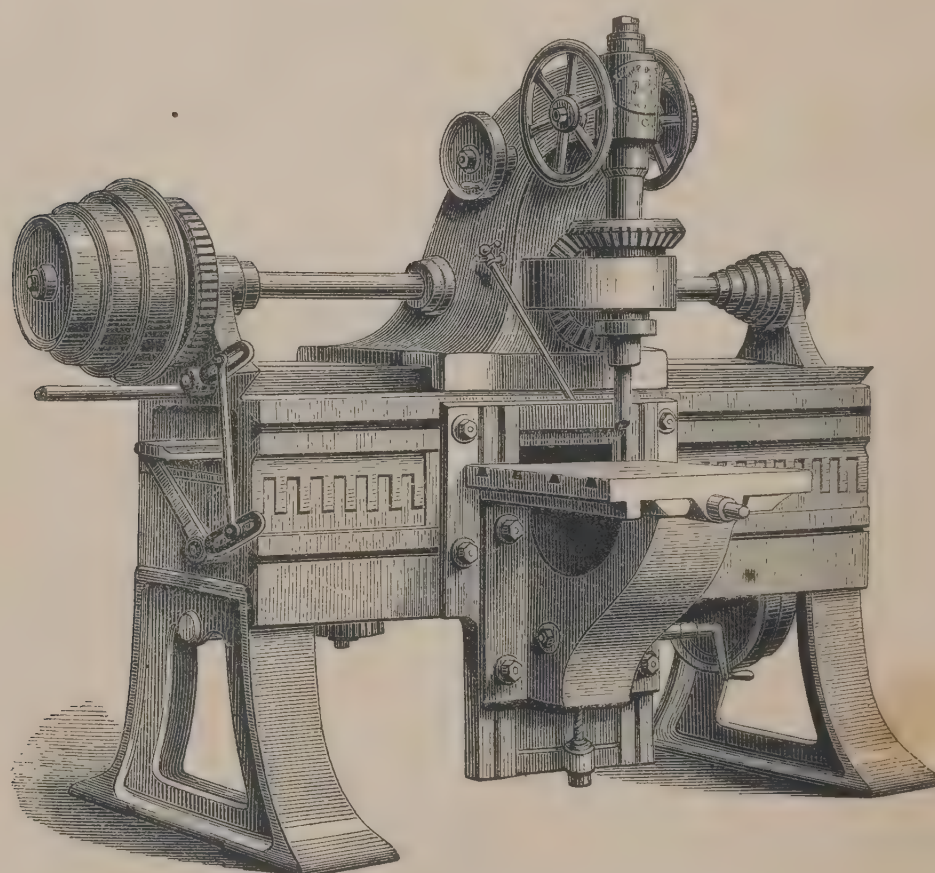
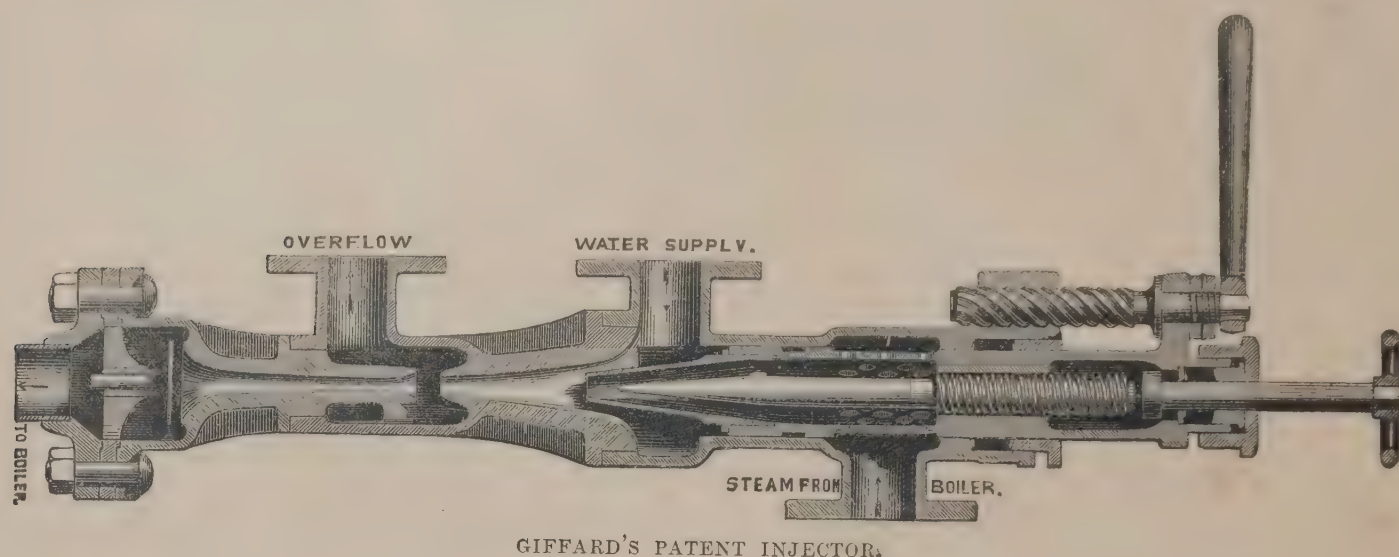


POCKET DIAMOND WITH PENCIL, LENGTH 4 $\frac{1}{4}$ INCHES.



POCKET DIAMOND WITH PENKNIFE.

SHARP, STEWART, & CO., *Atlas Works, Manchester.*—Workshop tools, wheel lathe, Giffard's injectors for feeding steam boilers.

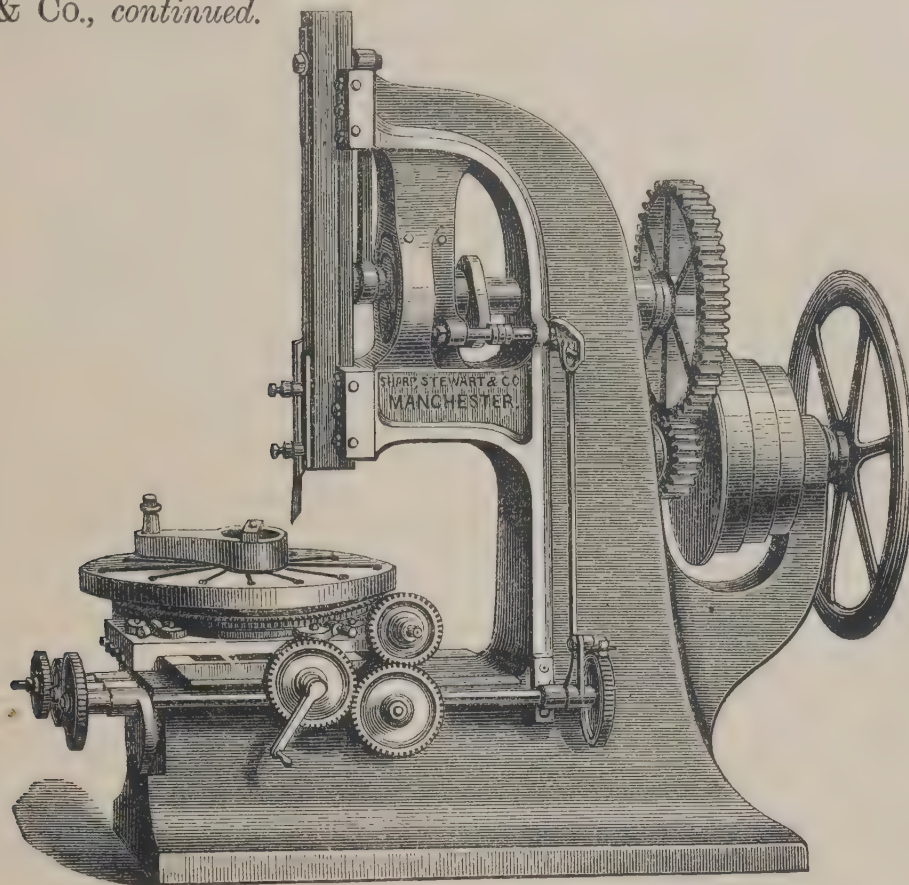


SLOT DRILLING AND GROOVING MACHINE.

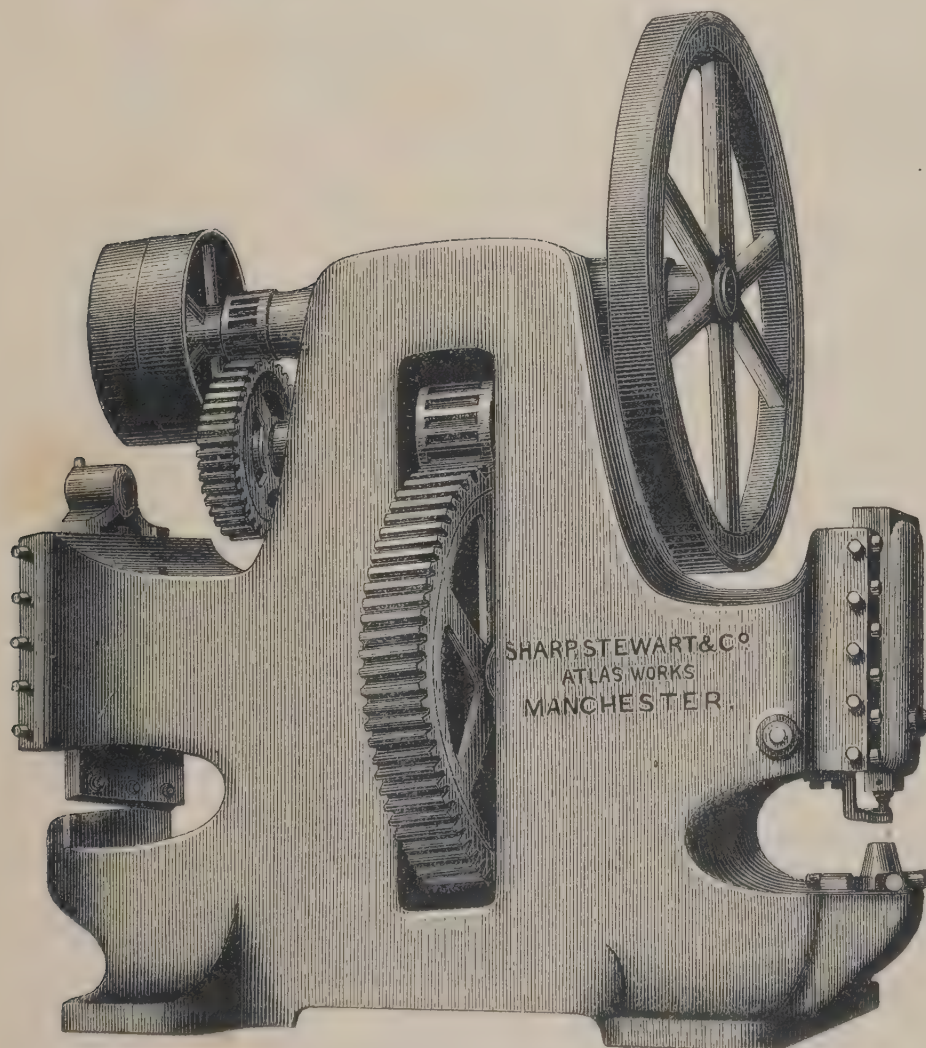
Obtained the Council Medal in 1851.

1. DOUBLE FACE-PLATE SELF-ACTING LATHE, for turning and boring railway wheels up to 6 ft. diameter, with four double-swivel compound slide rests, with self-acting longitudinal and transverse motions.
2. SELF-ACTING SHAPING MACHINE, with variable stroke up to 25 in. and quick return motion for the tool; adapted for surfacing and shaping plane, angular, and circular work.
3. SELF-ACTING SHAPING MACHINE with variable stroke up to 6 in.; adapted for surfacing and shaping plane, angular, and circular work.
4. SELF-ACTING SLOTTING MACHINE with variable stroke up to 9 in. with self-acting feed motions to the transverse and longitudinal slides and to the revolving worm table; adapted for paring and shaping externally or internally.
5. DOUBLE-GEARED SELF-ACTING VERTICAL DRILLING AND BORING MACHINE with swivel table which can be raised by power.
6. SELF-ACTING VERTICAL DRILLING MACHINE with adjustable table.
7. INDEPENDENT RADIAL DRILLING MACHINE with self-acting feed motion, the arm raised by power and radiating from the centre of the pillar.
8. PATENT DOUBLE-GEARED SELF-ACTING SLOT DRILLING AND GROOVING MACHINE with two independent headstocks, either of which can be used as an ordinary drilling or boring machine.
9. PATENT SELF-ACTING SLOT DRILLING AND GROOVING MACHINE with single headstock, which can also be used as an ordinary drilling or boring machine. (This machine is exhibited in two sizes.)

SHARP, STEWART, & Co., *continued.*



4. SELF-ACTING SLOTTING MACHINE.



11. MACHINE FOR PUNCHING HOLES.

10. PATENT DOUBLE-GEARED SLOT DRILLING AND BORING MACHINE, especially adapted for heavy, stationary, or marine work.

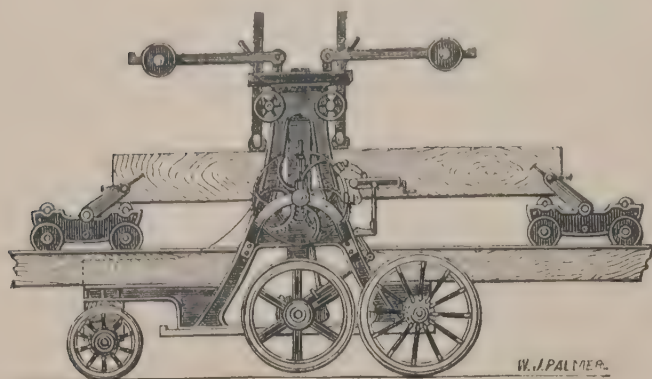
11. MACHINE FOR PUNCHING HOLES up to $1\frac{1}{4}$ diameter in $1\frac{1}{4}$ plates, with apparatus for disengaging the punch, and for shearing $1\frac{1}{4}$ plates; the shearing slide placed at an angle so as to cut off bars of any length.

12. SELLER'S PATENT SELF-ACTING BOLT AND NUT SCREWING MACHINE to screw up to 2 in. diameter. The bolt is withdrawn without stopping or reversing the machine.

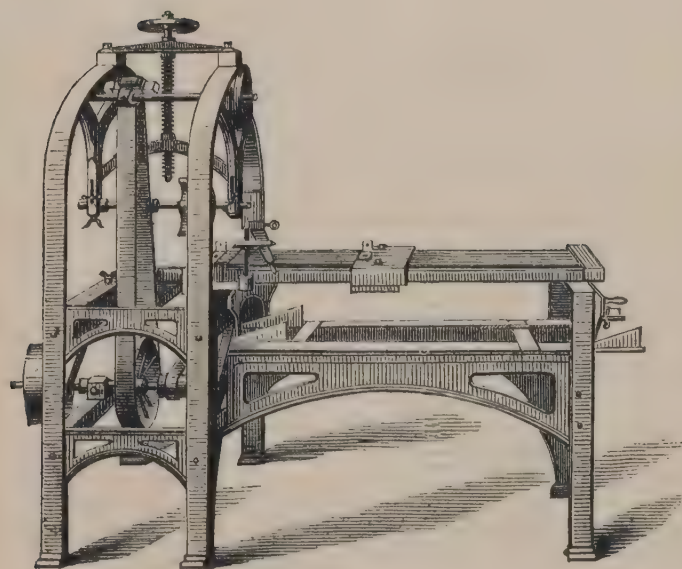
13. SELLER'S PATENT SELF-ACTING BOLT AND NUT SCREWING MACHINE to screw up to 1 in. diameter.

14. PATENT SELF-ACTING MACHINE for winding cotton, linen, or silk sewing thread upon reels.

ROBINSON, THOMAS, & SON, *Rochdale*.—Sawing, planing, moulding, mortising, tenoning, and sharpening machines for working wood.



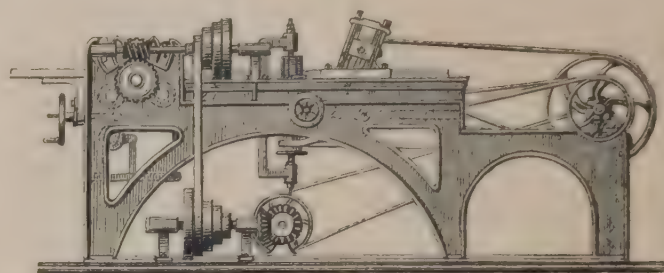
PATENT PORTABLE FRAME for sawing trees, logs, and deals into boards, planks, or scantlings.



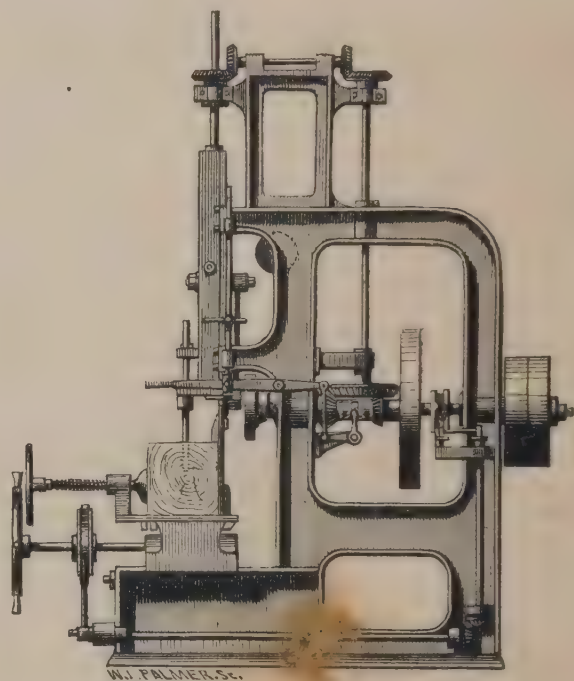
IMPROVED TENONING MACHINE for cutting single and double tenons, scribing sashes, trenching, and grooving.

LIST OF MACHINES MANUFACTURED BY T. ROBINSON & SON :—

Circular saw benches.	Moulding ditto.
Timber frames.	Squaring ditto.
Deal ditto.	Tenoning ditto.
Portable log and deal frames.	Veneer sawing machine.
Planing machine.	Endless band sawing do.
	Sweep ditto.



PATENT MOULDING AND PLANING MACHINE for planing floor and match boards, and working mouldings.



IMPROVED MORTISING MACHINE with self-acting variable descending and ascending motion to chisel.

Mortising ditto.
Boring ditto.
Wheel-spoke ditto.

Rifle-stock ditto.
Wood-turning lathes.

Complete sets of machinery designed and arranged for contractors, ship builders, carriage and waggon works, saw mills, planing and moulding mills, railway companies, Government arsenals and dock yards.

London Office, Unity Buildings, 8, Cannon Street, E.C

[1705]

SHEPHERD, HILL, & Co., *Union Foundry, Leeds*.—Machinery.

[1706]

SIEBE, AUGUSTUS, 5 *Denmark Street, Soho*.—Paper-knotting machine.

[1707]

SIEMENS, HALSKE, & Co., 3 *Great George Street, Westminster*.—India-rubber covering machines; submarine cable of new construction.

[1708]

SIMPSON, R. E. & Co., *Glasgow*.—Patent American single and double action shuttle sewing machines, with all the latest improvements.

[1709]

SINCLAIR, JOHN, 541 *Castle Hill, Edinburgh*.—Ornamented laid dandy roll for watermark on paper.

[1710]

SINIBALDI, MADAME C., *London*.—Chain machine, cranks, pistons, printing press, &c. (*See page 90.*)

[1711]

SMITH, ARCHIBALD, *Princes Street, Leicester Square, W.*—Patent machinery for making submarine cables and wire ropes.

[1712]

SMITH & COVENTRY, *Ordsal Lane, Manchester*.—Radial drill, improved screwing lathe, and other tools for cutting metals.

[1713]

SMITH & Co., *Marsh Gate Lane, Stratford*.—Patent machine for thrashing corn without injuring the straw.

[1714]

SMITH & HAWKES, *Eagle Foundry, Birmingham*.—Chilled cast rolls, tested iron, and bricks; testing machine, diagrams.

[1715]

SMITH, BEACOCK, & TANNETT, *Victoria Foundry, Leeds*.—Self-acting machine tools for shaping, slotting, turning, and rifling.

[1716]

SMITH, CHARLES, 30 *White Street, late 140 York Street, Hulme, Manchester*.—Grocer's patent soap-cutting machine.

[1717]

SMITH, EDWIN, *Cemetery Road, Sheffield*.—Pointing and carving machine for objects in the round and relieve.

SMITH'S PATENT POINTING AND CARVING MACHINE, for the use of sculptors and carvers in general, is capable of producing in marble, stone, wood, &c. statuary, busts,

and other ornamental objects, in the round, and in relieve.

The combined advantages of this machine, are facility of execution and unerring accuracy.

[1718]

SMITH, JAMES, & Co., *Crown Court, Crown Street, Finsbury*.—The "English" continuous-motion shuttle sewing machine, simple, easy, durable, and cheap.

This machine, which is the first and only one on this principle, was invented and patented in this country. It comprises all the latest improvements; it is simple,

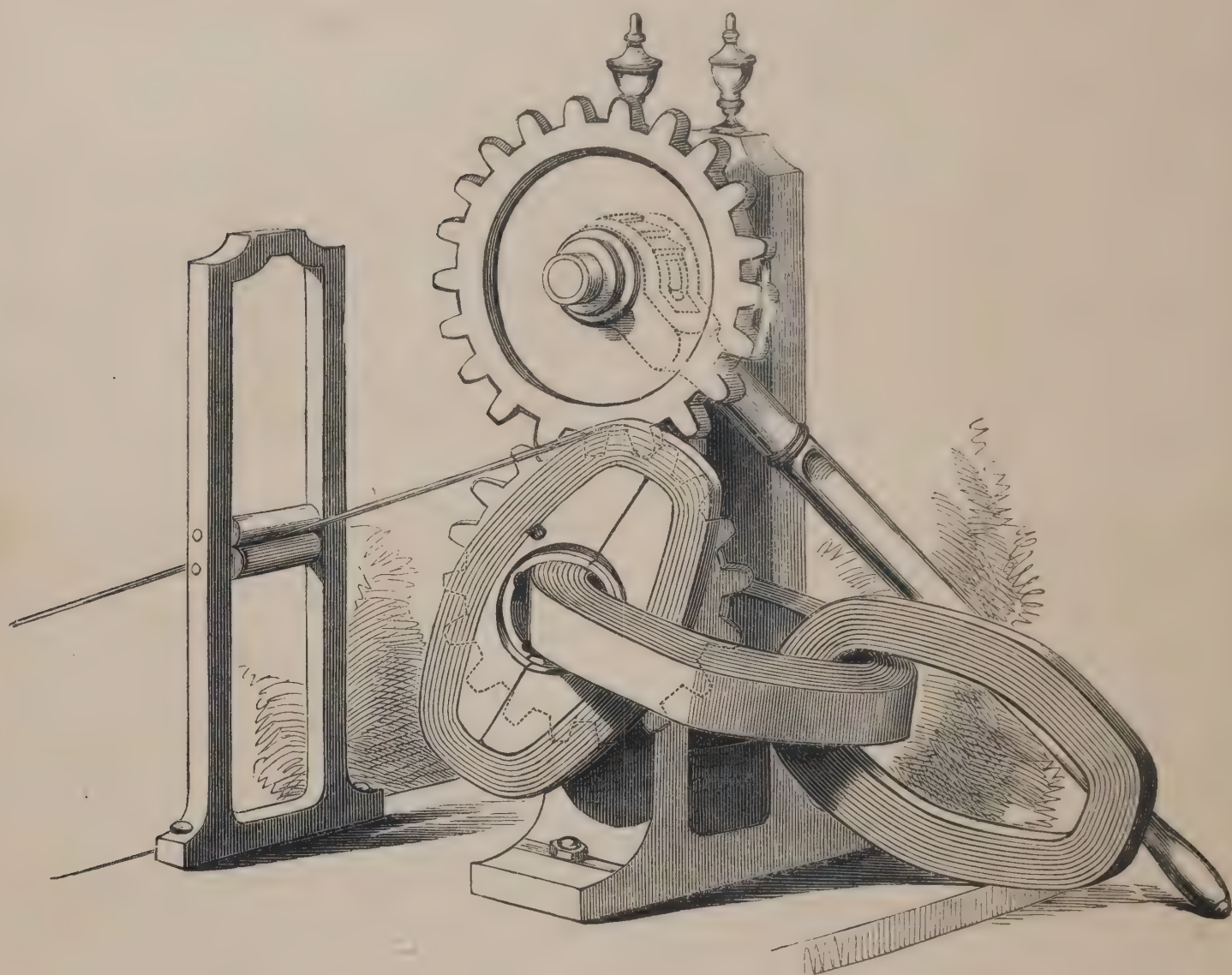
durable, noiseless, and rapid; and its working may be easily learned.

Prices, on stand complete, £8, £10, £12.

[1719]

SMITH, JOHN, *Ororton, near Prescott*.—Nippers and pliers, and an assortment of Lancashire joint tools.

SINIBALDI, MADAME CELESTE, 5, *Albert Terrace, Notting Hill.*—Chain machine, cranks, pistons, axles, plates, printing press, bolts, arms, screws, brazed bath.



CHAIN MACHINE.

The accompanying woodcut shows this machine performing the double operation of making a link and joining it to one already formed. One end of the band of metal is held in the notch of the mould on which it is wound. The mould and the cog-wheel on which it is fixed are

made in valves so as to open and admit and retain the links as they are formed. Two ribbons of metal may be used in making links by this process, one of iron and one of steel. This patent is the property of the Duke of Buccleugh.

[1720]

SMITH, JOHN & SON, 8 *Upper Fountain Place, City Road, E.C.*—Model moulds and rollers used in paper-making ; watermarks.

[1721]

SPELLER, WILLIAM, 14 & 15 *York Street, Blackfriars Road, S.E.*—Artesian-well boring tools and pump works.

[1722]

STEVENS' PATENT BREAD MACHINERY COMPANY, 10, *Old Jewry Chambers, London.*—Machinery for kneading dough, dispensing with the dirty hand-and-arm process. (See page 93.)

[1723]

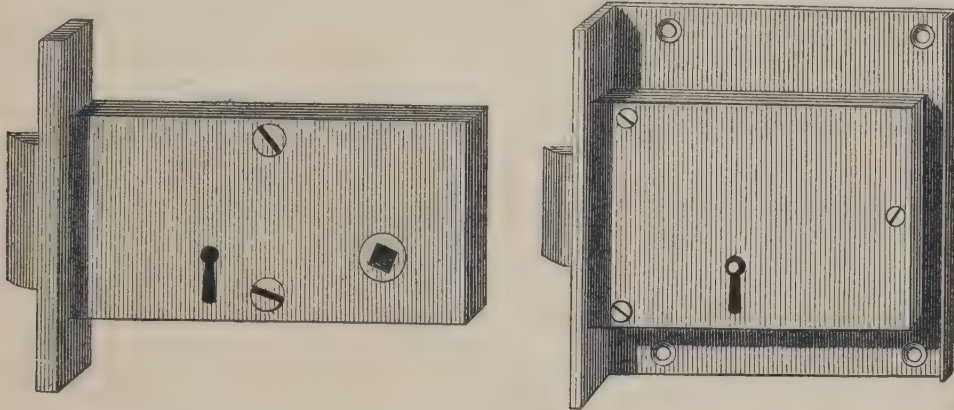
STONE, JOSIAH, *Deptford, London*.—Machine for making 1000 cast-metal nails at one time.

[1724]

STOTHERT & PITT, *Bath*.—Machine for striking or scraping leather hides ; model machine for rolling leather. (See page 94.)

[1725]

SWEET, A., 20 *St. James's Place, Hampstead Road, N.W.*—Case of challenge locks.



As these locks are new inventions, and as yet untested, the exhibitor refrains from commenting on their merits. At the same time he confidently challenges the inquiries and experiments of the most scientific locksmiths, and offers a premium of ten guineas to any person who shall open any one lock in less time than that specified upon it. Thus, the time given to open No. 3, which is a mortise

letter lock, is from the opening to the close of the Exhibition. For No. 2 (a night-latch) the time allowed is 8 consecutive hours. The price of the former lock is £2, and of the latter 10s.

The exhibitor believes that in point of cheapness, security, and durability, these locks possess merits worthy of attention.

[1726]

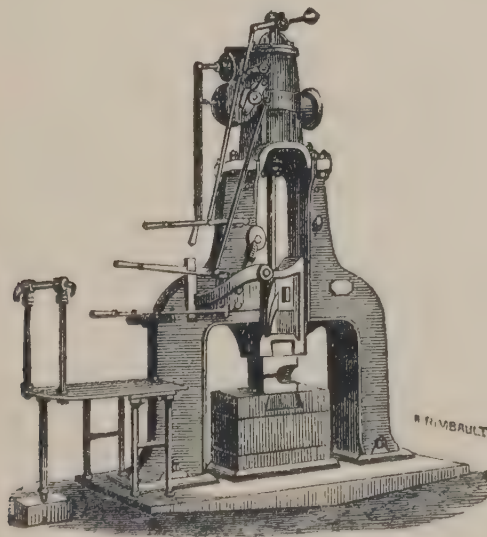
THOMAS, W. F., & Co., 1 *Cheapside, and 66 Newgate Street, London*.—Sewing machines, and samples of work produced by them. (See page 95.)

[1727]

THOMPSON, ROBERT HENRY, *Her Majesty's Dockyard, Woolwich*.—Machine for joiners' purposes ; horizontal sawing machine ; tree-felling machine. (See page 92.)

[1728]

THWAITES & CARBUTT, *Vulcan Iron Works, Bradford, Yorkshire*.—Steam hammers and engineers' tools.



PATENT DOUBLE-ACTION SELF-ACTING STEAM HAMMER.

A 7-cwt. patent double-action self-acting STEAM HAMMER.

A 4-cwt. double-action SINGLE STANDARD HAMMER.

Pillar radial DRILLING MACHINE.

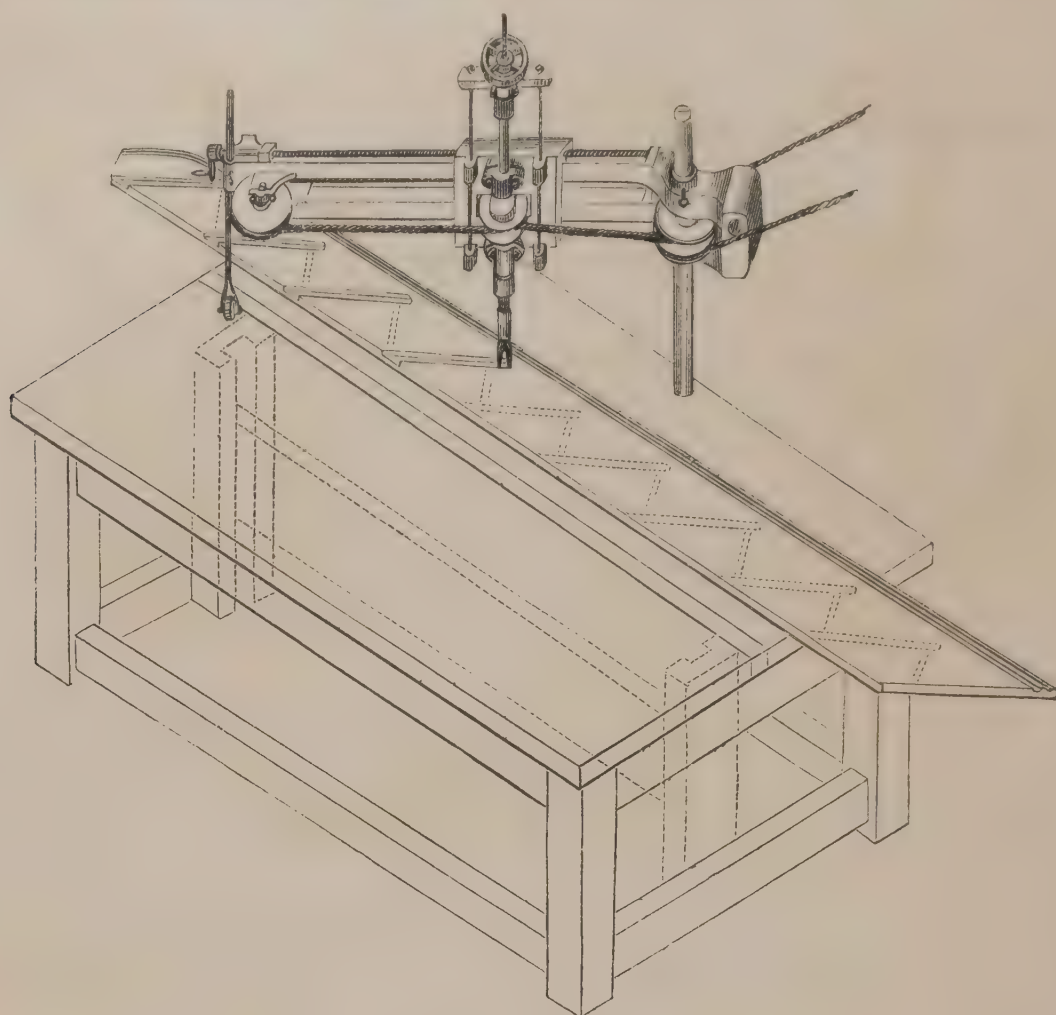
A 6-in. centre SLIDE AND SCREW CUTTING LATHE, with compound slide rest.

A ratchet DRILL-STAND MODEL.

Model of a very powerful PLANING MACHINE.

A 10-in. centre DOUBLE-GEARED SLIDE LATHE, with compound slide rest.

THOMPSON, ROBERT HENRY, *Her Majesty's Dockyard, Woolwich.*—Machine for joiner's purposes ; horizontal sawing machine ; tree-felling machine.



THOMPSON'S PATENT UNIVERSAL JOINER.

THOMPSON'S PATENT UNIVERSAL JOINER. Price, royalty included. £50 0

This is the most complete, simple, and inexpensive machine of its kind as yet invented. It prepares every description of joiner's work, including gothic heads, elliptic and all other curves ; mouldings of every description ; the strings of stairs, with treads, risers, and handrails ; and also ornamental and plain work for cabinet-makers and coach-builders. It can likewise be used in masonry for the preparation of stone-work for windows, &c. whether straight or curved, moulded or plain. It can be worked either by hand or by power.

THOMPSON'S PATENT TREE-FELLER. Price, including royalty £40 0

This machine can be erected in a few minutes upon any land, irrespectively of the nature of its surface. It requires but little skill or power to work it ; can be used

in felling trees of any size. From the rapidity of its action, and simplicity of construction, will be found of great service to all timber dealers, and of especial value to colonists.

THOMPSON'S PATENT PORTABLE HORIZONTAL SAWING MACHINE. The price, including royalty, varies from £60 to £80 0

This machine is well fitted for siding trees, or for cutting them into planks, &c. on the spot where they are felled, whatever be the formation of the ground. The felling-gear can be adapted to form part of this machine, and the whole can be put together and worked by any ordinary labourer. From the very rapid motion of the saws, and the small degree of power necessary, an immense saving both of time and money will be found in converting and removing timber.

Agent, T. Meacham, 2 New London Street, Fenchurch Street, E. C.

[1729]

TIDCOMBE, GEORGE, & SON, *Watford, Herts.*—A continuous-sheet paper-cutting machine.

[1730]

ULLMER, F. & W., *Castle Street, Holborn.*—Patent cylindrical printing machine, patent diagonal paper-cutting machine.

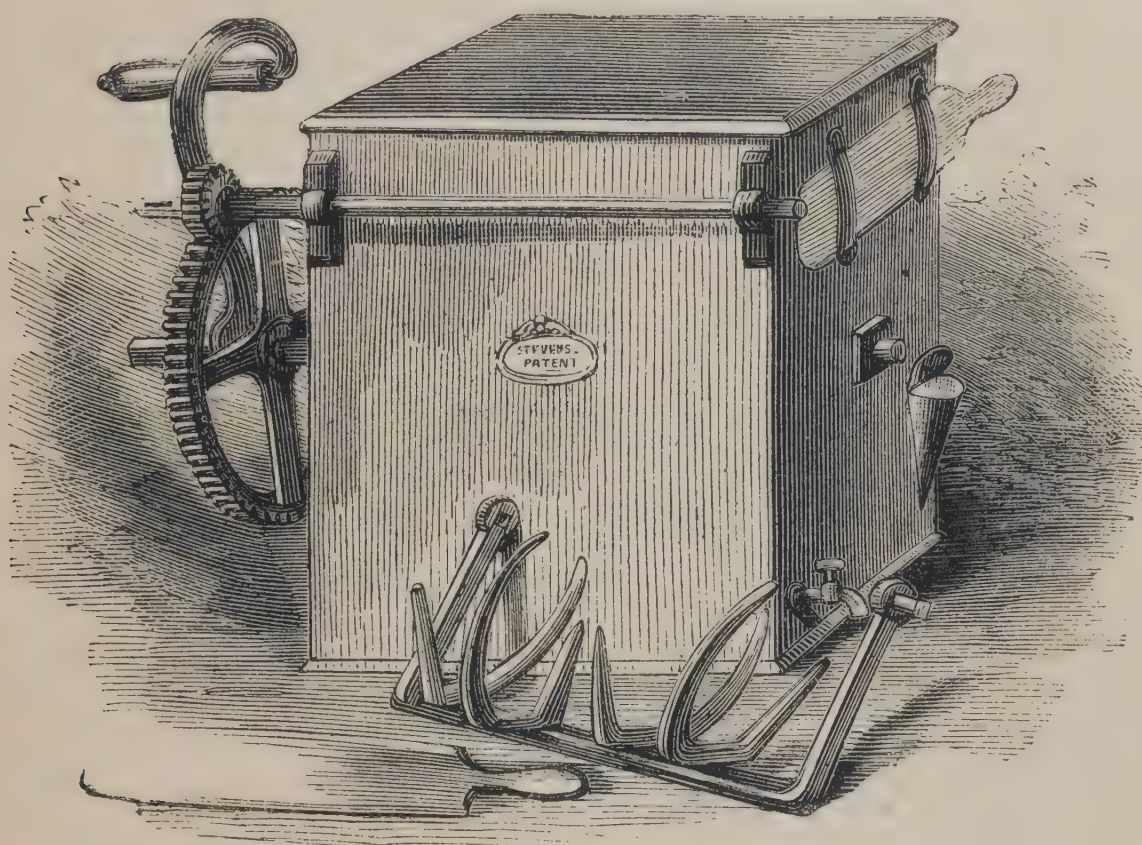
[1731]

VERO, JAMES, *Atherstone.*—Machine to remove fur and wool from skins preparatory to leather making.

[1732]

VICARS, T. & T., & Co., *Wheatsheaf Foundry, Liverpool.*—Bread and biscuit machinery.

STEVENS' PATENT BREAD [MACHINERY COMPANY, LIMITED, 10 *Old Jewry Chambers, London.*—Machinery for kneading dough, dispensing with the dirty hand-and-arm process.



FAMILY BREAD MACHINE.

E. STEVENS' BREAD-MAKING MACHINES AND UNIVERSAL CAKE AND PUDDING MIXERS.

Patented in Great Britain, France, and Belgium.

This invaluable invention is alike suited for the use of private families and the largest public establishments. It has already been successfully adopted by Government, East India Council, several public institutions, bakers, as well as in private families. It ensures pure and superior clean bread, and repays its cost shortly. It is produced in sizes to mix from one quartern of flour to five sacks at one time, and is applicable for making every kind of bread.

Prices :

Family machines range from 35s. to £5 each, the former of which will mix at one time from 2 to 8 2-lb. loaves, while the latter will make from 15 to 30, with intermediate sizes. Machines suitable for public institutions, and bakers, range from £10 to £100 each; a trade machine capable of mixing 2 sacks of flour at one time, may be had as low as £30. Illustrated catalogues free of charge.

These machines are all made of the best materials, occupy but little space, are readily understood, and, owing to the simplicity of their construction, seldom or never get out of order.

The following are specimens of the numerous testimonials received:—

The Most Noble the Marquis of Sligo writes:—

"I have had your bread machine in use for the supply of my house for nearly four months, and I can most strongly recommend it; indeed, I have done so more than once to visitors, who left my house intending to procure one. It saves two-thirds of the labour of kneading, and enables any servant in the house to do the work; and I most strongly recommend it to every baking establishment on either a large or a small scale."

The Right Hon. Lord Camoys writes:—

"You are fully at liberty to say and publish, that I

have one of your machines for making bread, and that I much approve of it."

Lieut.-Col. Colvill, Governor of the House of Correction, Cold Bath Fields, writes:—

"I am desired by the visiting judges to inform you that they are perfectly satisfied with the bread-making machinery which you have supplied to this establishment. The average consumption of flour daily here is ten sacks; the saving has been about 1s. 6d. per sack, or £4 7s. 6d. per week. The machine has been in constant use forty-six weeks, and in that time we have saved by the machine, £207. The bread is also much better; the cleanliness of the manufacture is admirable; it is a much healthier labour for the men, and the machine can be worked by any of the prisoners."

Deputy Commissary-General Robinson, of Aldershot Camp, writes:—

"Stevens' dough-making machine performs better in 20 minutes what occupies 45 by manual labour; and it has been proved to gain 12 lbs. of bread per sack of flour over what can be obtained by hand labour; the machine thus paying its own cost in a very short time."

Mr. M'Cash, master baker, of Stratford, London, writes:—

"I am perfectly satisfied with the whole operation of your dough-making machine. I believe the time is not far distant when the machine will be considered a necessity in all bakehouses, on account of its economy, and being alike a boon to master and man."

Mr. S. Shelton, Peterborough, writes:—

"I am a baker of thirty years' standing, and I confidently believe that no invention has ever given more benefits to the working man in any trade than your machine has to ours."

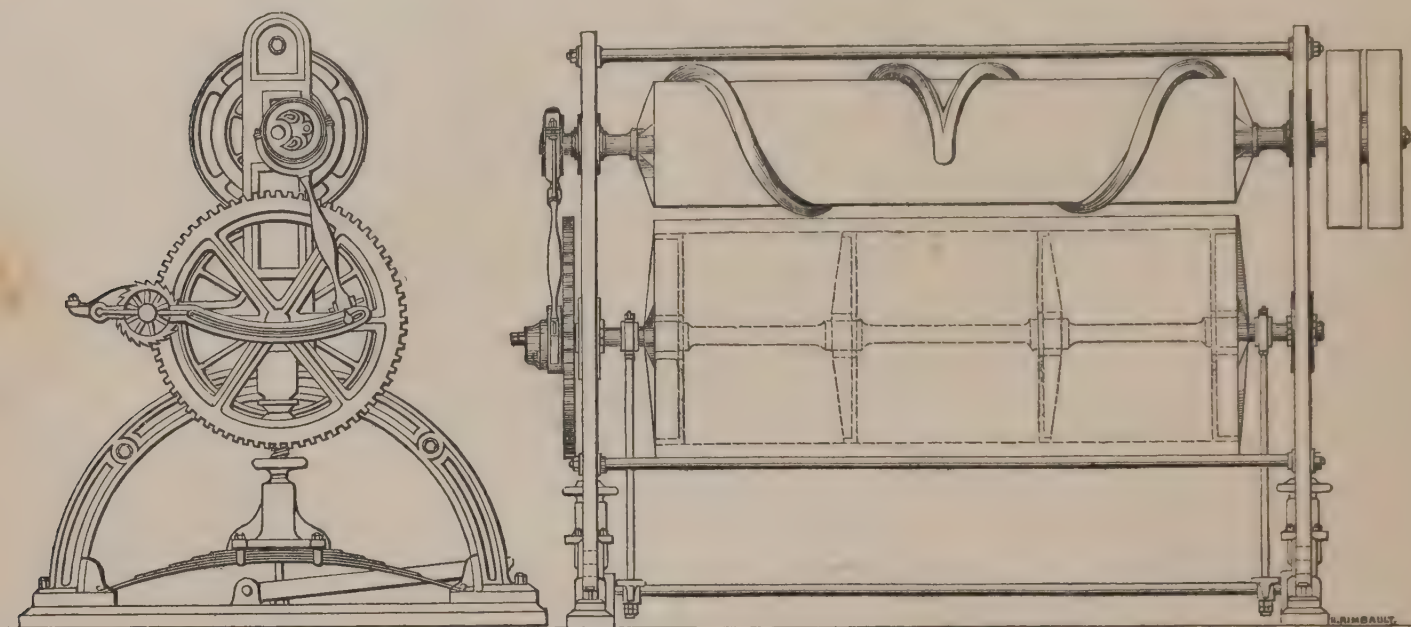
For further testimonials from noblemen, gentlemen, physicians, proprietors and heads of public establishments, master bakers, cooks, confectioners, &c. and opinions of the press, see the trade prospectus, which may be obtained by applying at the offices of the Company.

STOTHERT & PITT, *Bath*.—Machine for striking or scraping leather hides. Model machine for rolling leather.

COX'S PATENT MACHINE WITH PITT'S PATENT IMPROVEMENTS FOR STRIKING OR SCRAPING HIDES.

The hide, being laid upon the lower wood roller, is gradually allowed to pass beneath the upper roller, which carries a sharp-edged spiral knife. The lower

roller, being supported on springs, maintains a uniform but yielding pressure, and adapts itself to the varying thickness of the hide; the knife in the mean time scraping out the bloom most completely in the space of about three minutes. The machine is also used for rubbing down foreign shoulders, and for dressing offal.



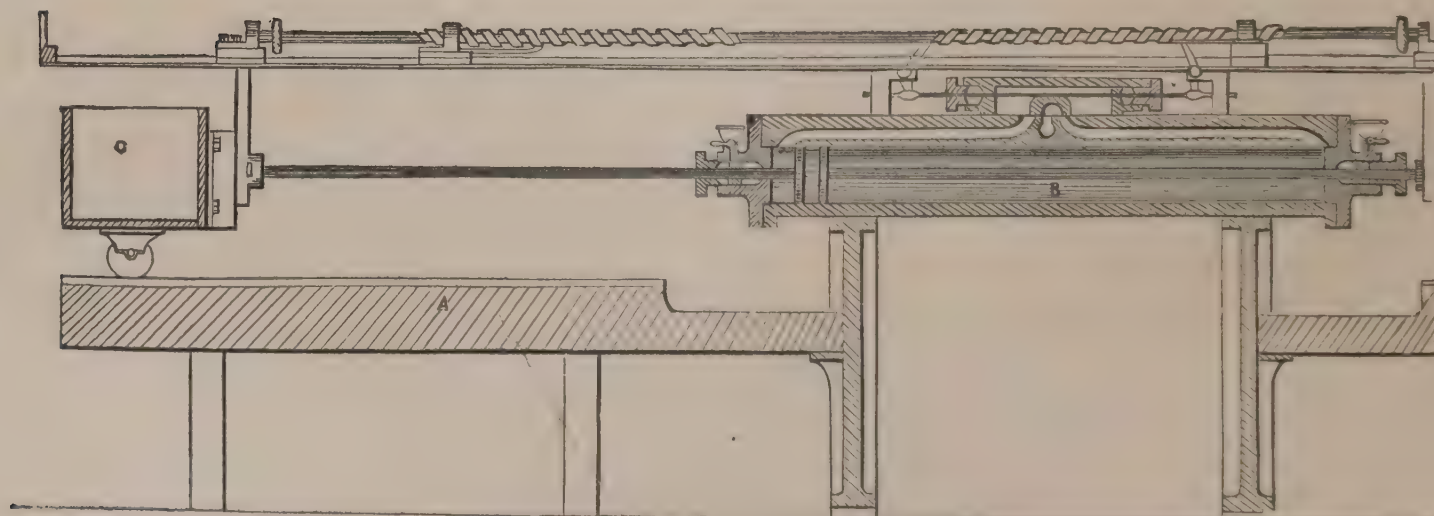
COX'S PATENT MACHINE FOR STRIKING OR SCRAPING HIDES.

RIPLEY'S PATENT ROLLING MACHINE, improved and manufactured by Stothert and Pitt.

The hide being laid upon the table *A*, steam is admitted to the cylinder *B*, and propels the loaded roller box, *C*,

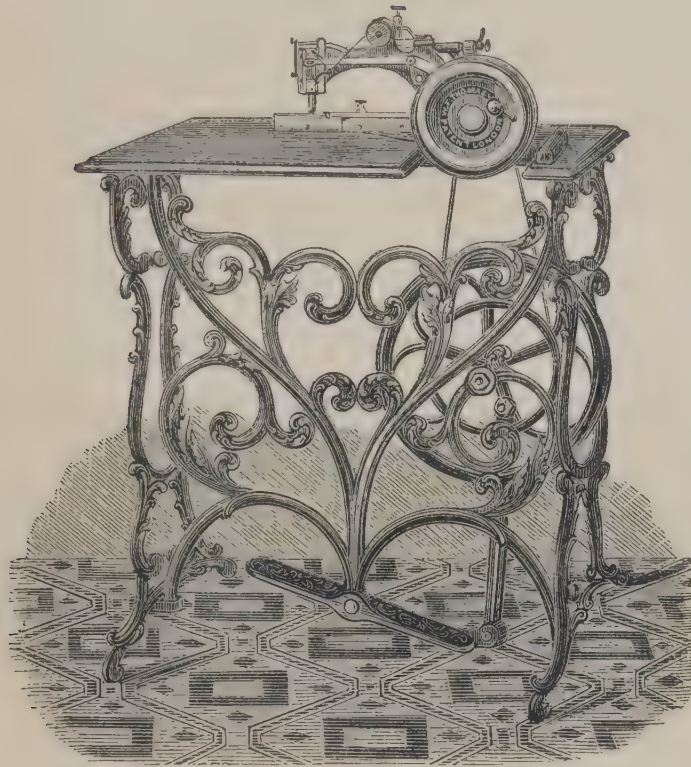
alternately from end to end of the hide. The motion being entirely self-acting, the attendant has both hands free. The stroke can be lengthened or shortened at pleasure.

The machine will roll from 15 to 20 butts an hour.



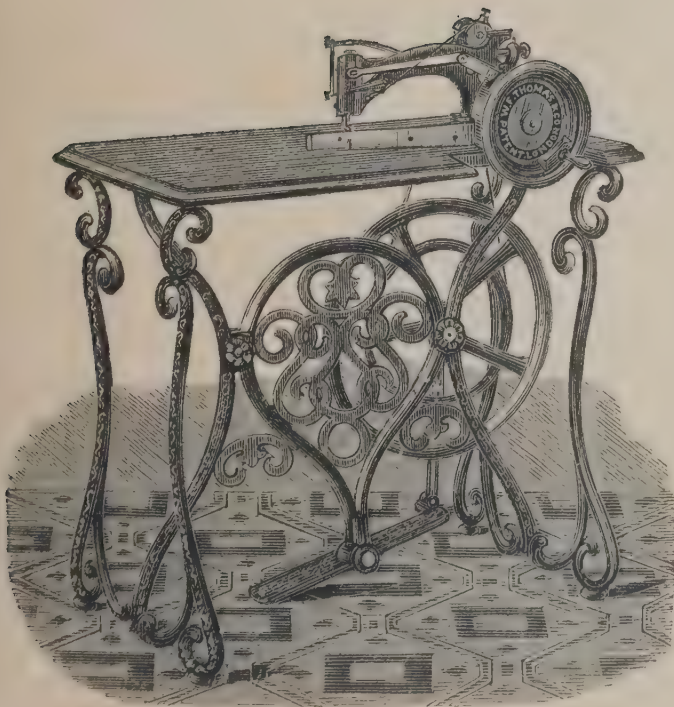
RIPLEY'S PATENT ROLLING MACHINE.

THOMAS, W. F., & Co., 1 *Cheapside*, and 66 *Newgate Street*, *London*.—Sewing machines, and samples of work produced by them.

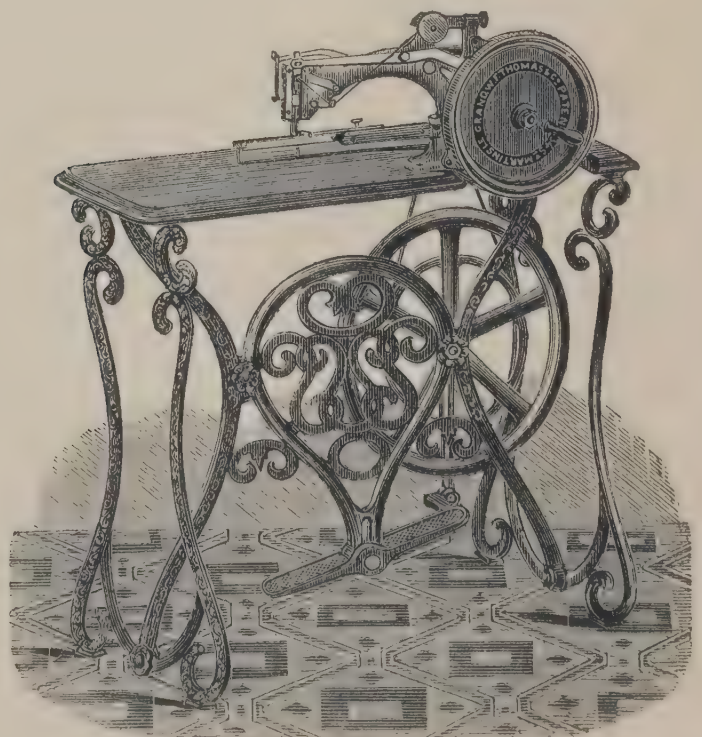


DOUBLE-ACTION SEWING MACHINE.

1 *B.* Double-action machine for domestic purposes, shirt-making, and light work of every kind.



DOUBLE-ACTION SEWING MACHINE.



DOUBLE-ACTION SEWING MACHINE.

2 *B.* Double-action machine for the use of boot-makers, tailors, shirt-makers, &c.

2 *C.* Double-action machine for dress and mantle making.

[1733]

VICTORIA SEWING MACHINE COMPANY, THE, 97 *Cheapside*.—Sewing machines.

[1734]

WATERLOW & SONS, *London*.—Railway ticket printing machine, to be worked by hand or power. (*See page 97.*)

[1735]

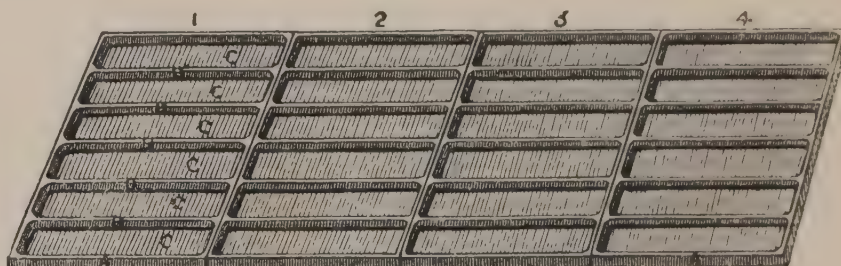
WATKINS, THOMAS, 89 *Bridge Street, Bradford*.—Porcelain guides, washers, steps, shuttle-eyes, &c., used in machinery.

[1736]

WATSON, HENRY, *High Bridge Works, Newcastle-on-Tyne*.—Improved knotter or pulp strainer, for paper makers.

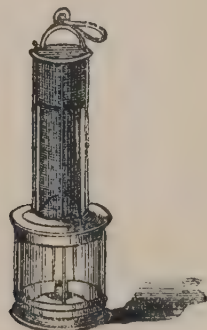
A A shows the thickness of the margin.

B B B B are ribs which stiffen the plate.



C C C C shows the slits cut between each rib.

KNOTTER BOTTOM IN FOUR PLATES, WITHOUT FRAME.



The Exhibitor manufactures
Brass and copper rolls for paper mills.
Jullion's patent pulp regulating elevator.
Gun-metal cocks, valves, water and steam guages,
hydraulic rams, &c.
Large brass castings, brass and copper work for
marine, locomotive, and other engines.



Safety lamp, the most improved in use in the north of England.
Armstrong's (Sir William) hydro-electric machines, for the production of electricity from steam.
Frames of brass or wood, with brass mountings, made to order.

[1737]

WEATHERLEY, HENRY, 54 *Theobald's Road*.—Confectioners' machines, &c., for hand or steam power.

[1738]

WESTON & HORNER, 80 *Whitecross Street, London*.—Patent self-feeding mortising machine.

This machine, which the inventor has had in private use for about twelve months, has been found to possess great advantages over those commonly employed, as will be readily apparent on examining it, and witnessing it in action. The bed, on which the material to be mortised is placed, is permanently fixed; the chisel-holder being raised or lowered, to suit its breadth. The "wedging" is obtained by inclining the chisel, which,

being self-oiled at every incision, involves the least possible degree of force in the operation. The "feed," or shifting of the material, is effected by means of a semi-self-acting arrangement. The machine is worked by a treadle, and is adapted for mortising, boring, drilling, dovetailing, &c.

It will be sold at prices varying, according to finish and completeness, from £7 10s. to £15 0

[1739]

WRIGHT & MANN, *Gipping Works, Ipswich*.—The "Excelsior" sewing machine.

This is a new and improved sewing machine, making the "double loop" or tight stitch." It is suitable for the use of families, manufacturers, dress, and mantle makers. The exhibitors keep in stock every requisite for working the sewing machine, such as needles, shuttles, bobbins, silks,

cottons, &c.; and are also prepared to supply first-class lock-stitch machines, for heavy manufacturing, at reduced prices. Price lists and prospectuses may be obtained by application at the works, or at the London dépôt, 122 Holborn Hill, E.C.

WATERLOW & SONS, London.—Railway ticket printing machines, may be worked by hand or power.

WATERLOW'S RAILWAY PASSENGER TICKET MACHINES.

These machines are manufactured of best materials in the best possible manner, and have been in use for several years at the offices of some of the principal railway companies in the United Kingdom, the British Colonies, and on the Continent, to whom we are permitted to refer, and whose experience forms the best guarantee of their speed, durability, and general efficiency. They are constructed with a fast and loose rigger, to work from a shaft, or may be driven by hand with perfect ease; printing, perforating, numbering consecutively, either at one or both ends of the tickets at one operation, at the rate of 8,000 to 10,000 per hour.

The plain tickets are inserted in the tube A, pass along the plate F, and rise into the tube F, in numerical order.

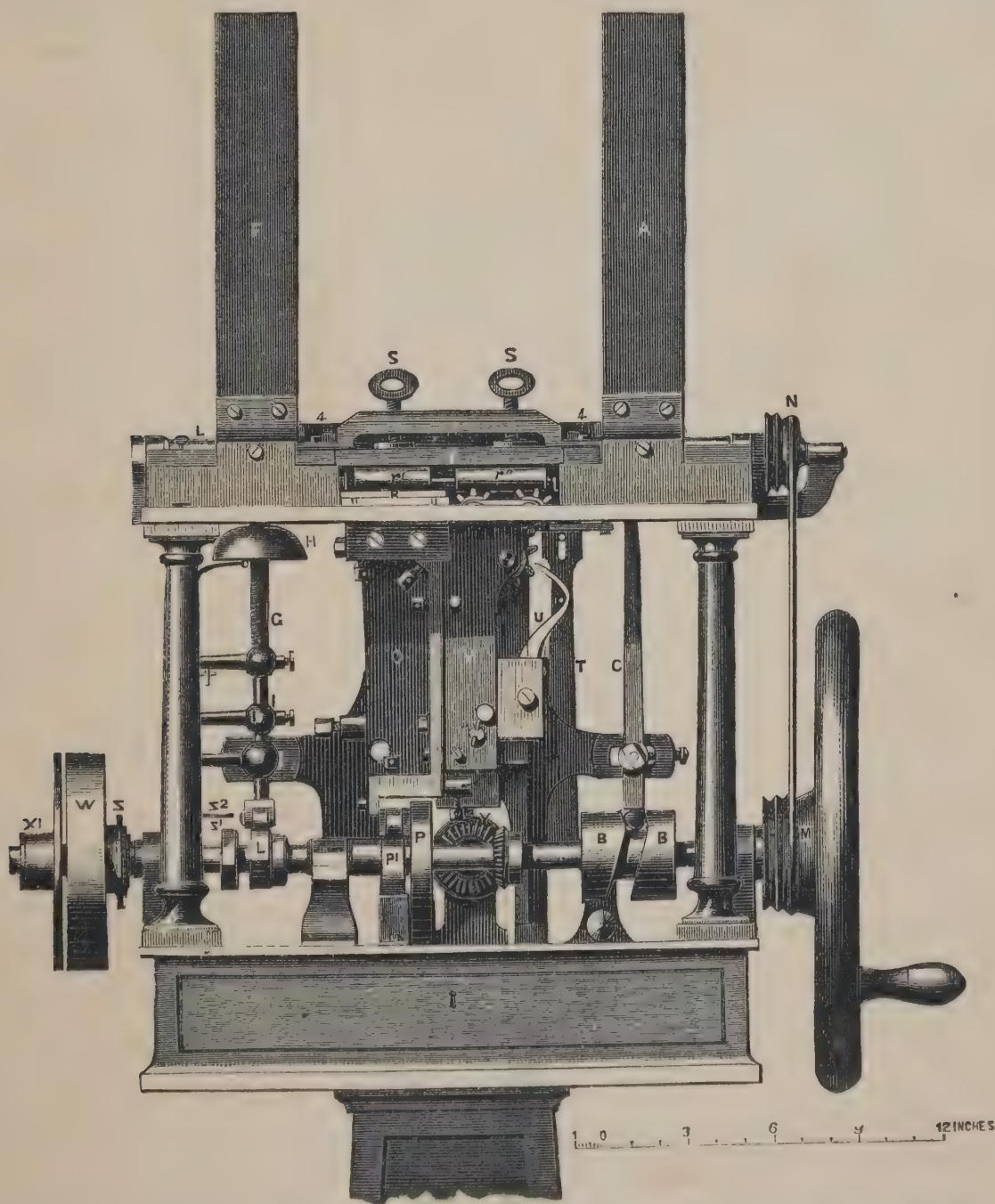
When the machine is driven from a shaft, the printer has simply to insert the bundles of plain tickets in one tube, taking the printed ones out on the other side, the machine stopping of its own accord and ringing a bell

when any derangement arises from an imperfect card or other cause.

List of some of the Railway Companies to whom these machines have been supplied.

Eastern Counties Railway, London.
Great Western Railway, London.
Midland Railway, Derby.
South Eastern Railway, London.
Great Northern Railway, London.
Buffalo and Lake Huron Railway, Canada.
Great Western Railway of Canada.
The Australian Railways.
Calcutta and South Eastern Railway.
Eastern Bengal Railway.
Vienna Railway.

The machines can be seen in operation, daily, at the Printing Offices, London Wall, where every explanation or information respecting them may be obtained.



UNPRINTED TICKETS, various colours and devices, perforated if required. A pattern card, containing 120 sorts, with prices of each attached, will be forwarded on application from any Railway Company, or their agent.

Great care is exercised in the preparation and examination of these tickets, and every defective one removed. The tickets are perforated singly, thereby ensuring the perforation falling in the centre, and the removal of

any imperfect ticket—a great advantage over all others yet submitted.

TICKET CASES, made of teakwood or oak, and finished in the best manner, at prices varying according to the number of tubes required. A detailed price-list forwarded on application.

TICKET SCREW BOX, or tying-up machine.

TICKET NIPPERS, best steel, from 2/0 per pair.

WATERLOW & SONS, *continued.*

TICKET DATING PRESSES, with set of steel types and box for same, complete.

Ribbon inking machine.
Printing ribbon.
Counting machines.
Guard and dispatch cash boxes.

Station cash bags.

Season-ticket cases, &c.

PRINTED TICKETS, single or double journey, once or twice numbered, and perforated if required, striped, parti- or double-coloured, at prices varying according to quantities and description. Estimates furnished if desired.

[1740]

WHITFIELD, H., *Rainhill, near Prescott.*—Lancashire files.

[1741]

WHITMEE, JOHN, & Co., 70 *St. John Street, Clerkenwell, E.C.*—Mills; weighing machines; Tice's patent gas regulators; Carley's patent elastic-stitch sewing machines.

[1742]

WHITWORTH, J., & Co., *Chorlton Street, Manchester.*—Machinery for cutting metals and timber. (*See pages 99 to 105.*)

[1743]

WILSON, W., *Campbellfield, Glasgow.*—Semi-dry pulverised clay brick-making machine.

[1744]

WOOD, J. & R. M., 89 *West Smithfield, E.C.*—Printing and stereotyping machinery, and type. (*See pages 106 and 107.*)

[1745]

WORSSAM, S., & Co., 304 *King's Road, Chelsea.*—Wood-working machines. (*See page 108.*)

[1746]

WRIGHT, JOHN, *Pathend, Kirkealdy.*—Mould-making machines for producing printing surfaces, and specimens of typing, &c.

[1747]

WYLIE, ALLAN C. (Successor to JOHN CONDIE), 8 *Cannon Street, London.*—Two Condie's patent steam hammers. (*See page 109.*)

[1748]

YATES, W. S., *Stamford Street, North Street, Leeds.*—Machine to assort bristles into sizes for brush manufacturers.

The exhibitor is the sole inventor of machines for assorting bristles into their various lengths and sizes. One of these machines is exhibited. It consists of ten nippers, and separates the bristles into $\frac{1}{4}$ in. lengths with accuracy and rapidity, depositing them in suitable receptacles. With the exception of feeding, this machine is entirely self-acting.

Machines may be obtained from the maker of any size required, varying from one to ten nippers. They have already secured the approval of those who have employed them in dressing bristles, and have been adopted both by English and foreign manufacturers. The exhibitor will be happy to furnish further particulars as to prices, &c. on application.

[1749]

YOUNG, J. & T., *Ayr.*—Vertical saw frame, to cut battens from twenty-four inches broad, and from five inches thick.

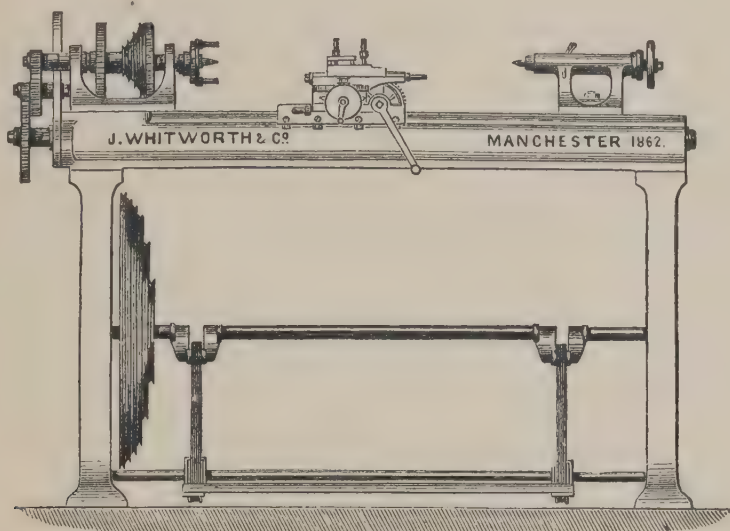
YOUNG'S IMPROVED SAW FRAME to cut 2 battens at once, from 24 in. broad and from 5 in. thick, with

patent silent feed motion. Price at the Works, exclusive of saws and buckles, £130.

[1750]

YOUNG'S PATENT TYPE COMPOSING AND DISTRIBUTING MACHINE COMPANY (Limited), 77 *Fleet Street.*—Type-composing machine, and type composing and distributing machines. (*See pages 110 and 111.*)

WHITWORTH, JOSEPH, & Co., *Chorlton Street, Manchester.*—Machinery for cutting metals and timber.

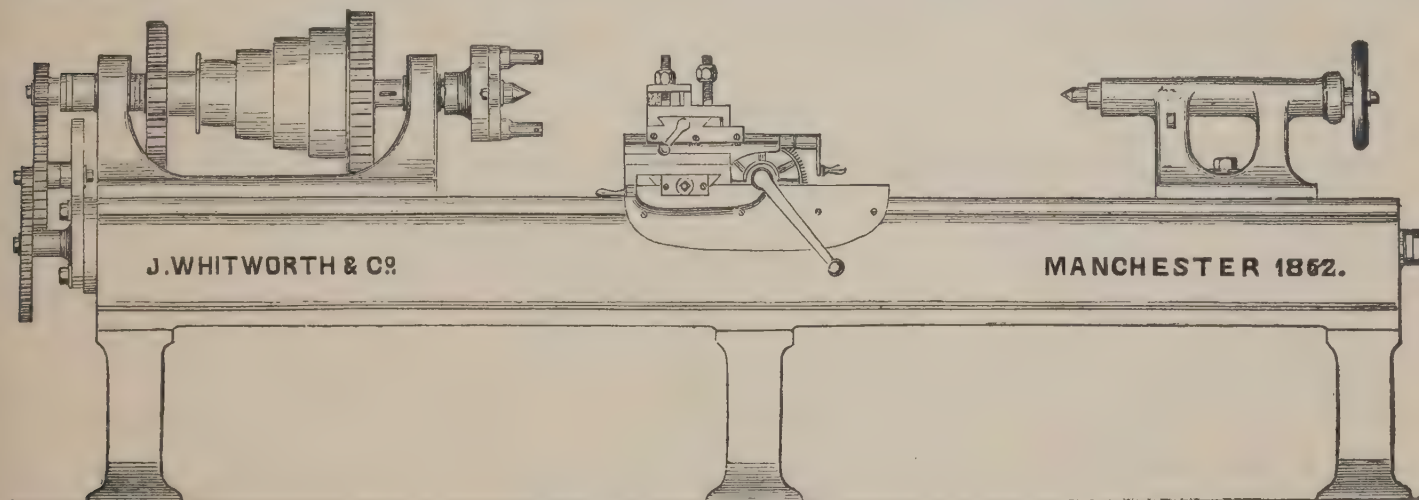


SELF-ACTING FOOT LATHE.

SELF-ACTING FOOT LATHES for the use of engineers, amateurs, philosophical-instrument makers.

They are suited for turning plain or ornamental work,

for small sliding, screwing, and surfacing, and are made of the several sizes from 5 to 9 in. centres, and with any requisite length of bed. They are sometimes supplied with chucks of various descriptions and overhead motion.



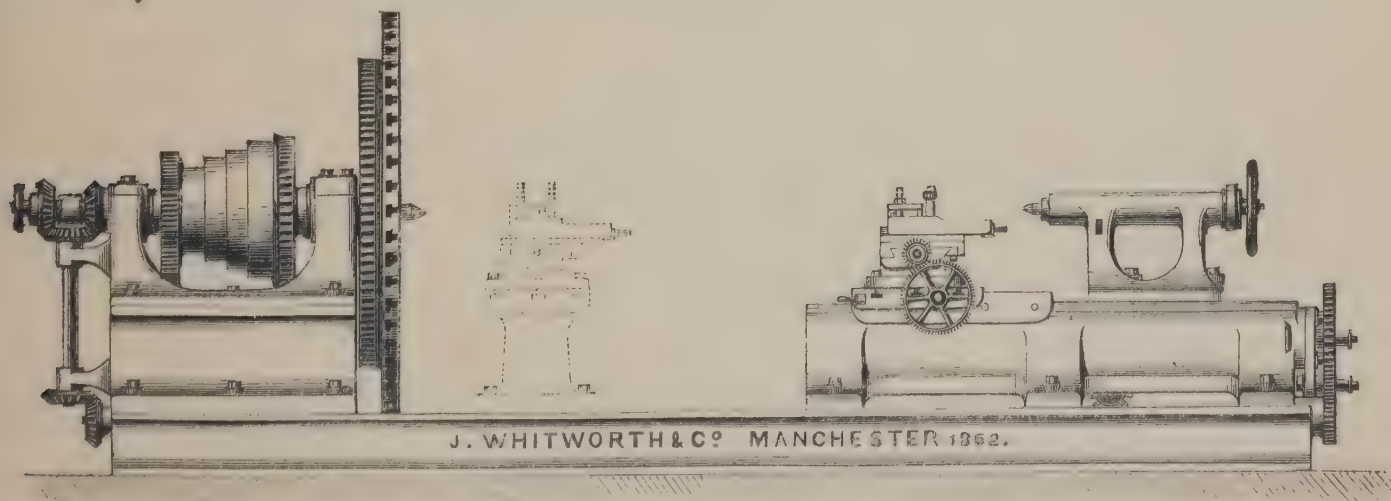
SELF-ACTING LATHE.

SELF-ACTING LATHES for sliding, screwing, surfacing, and boring.

They are furnished as single or with the patent duplex motion. The latter having two tools, will turn double the quantity of work that the single lathe can, and of a better quality. For sliding shafting, the duplex principle is invaluable, as the lateral strain put upon the

shaft by the single tool is neutralised by the additional tool acting opposite to it.

The lathe exhibited is a medium size, with 10-in. centre and bed 10 ft. long. The sizes usually manufactured range from 6 in. to 36 in. in height of centre, and are made with any required length of bed.



SELF-ACTING BREAK LATHE.

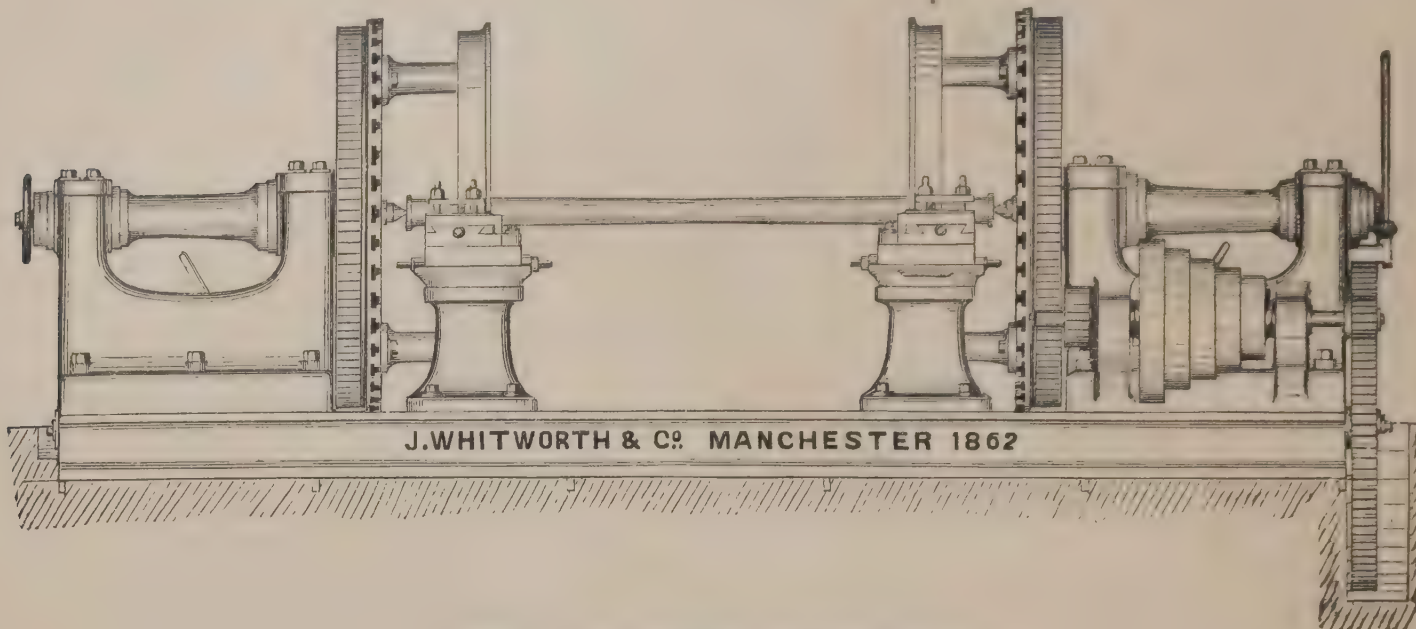
SELF-ACTING BREAK LATHES, with geared headstocks, large face plate, with wheel at the back, heavy foundation plate, planed and grooved on its upper surface, extending the entire length and breadth of the lathe.

The bed is movable on the foundation plate by rack

and pinion, so as to form a break for admitting work of a large diameter.

These lathes are universal in their application, being suitable for sliding, screwing, surfacing, and boring, and for large and small work. They are made of several sizes, admitting work varying from 4 ft. to 10 ft. diameter, and of any length.

WHITWORTH, JOSEPH, & CO., *continued.*



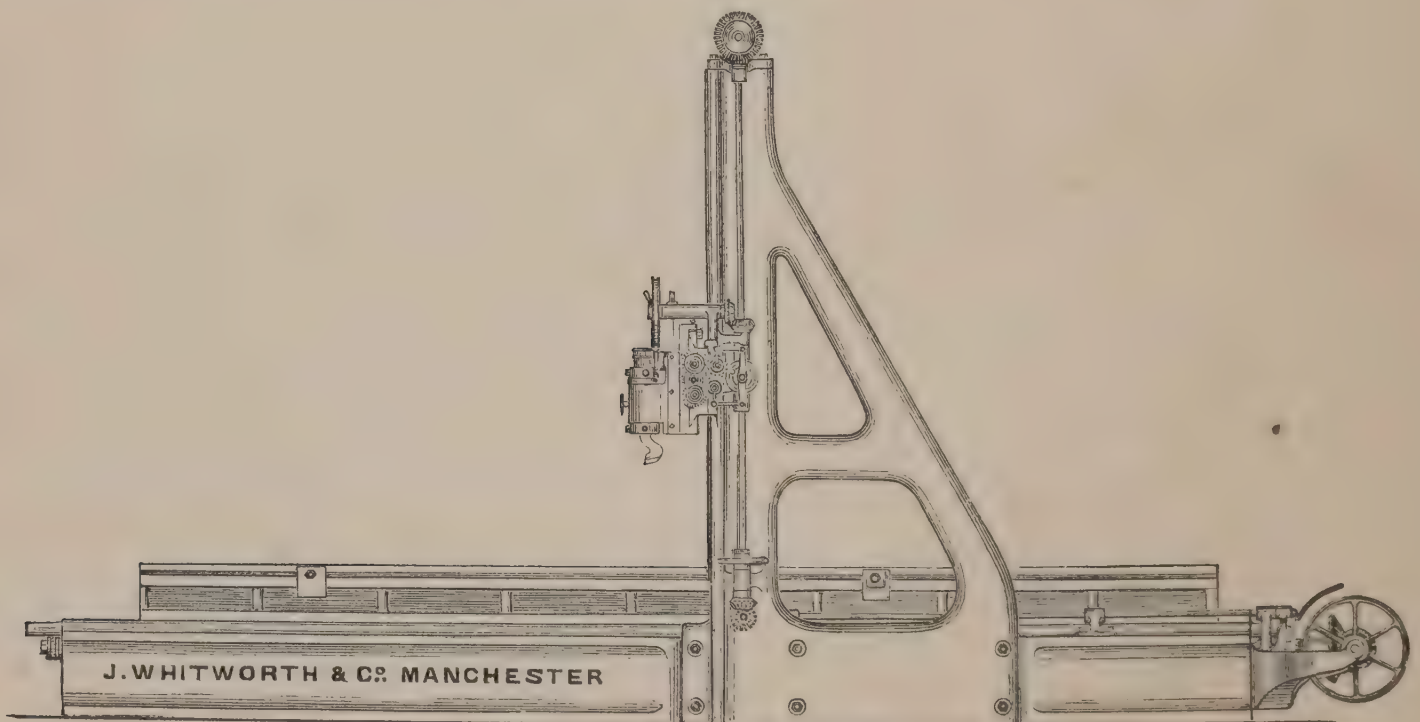
PATENT RAILWAY-WHEEL TURNING LATHE.

PATENT SELF-ACTING RAILWAY-WHEEL TURNING LATHE, for boring or turning both wheels at once, on or off their axles.

In the patent duplex wheel lathe, four cutting tools are employed which act simultaneously at opposite sides of each wheel. Both wheels are turned at the same time, and the rests are readily removable to allow of the wheels being placed in, and removed from the lathe.

The headstocks are driven independently, and are adjustable apart by means of rack and pinion.

The rests are worked by overhead self-acting motion, and are independent of each other. They are provided with two transverse motions and a swivelling motion, so that they may be set at any required angle. The peculiarity of the lathe consists in the employment of four cutting tools, which enables the work to be produced in half the time that the ordinary lathe with two tools takes. These lathes are made of several sizes for turning wheels from 3 ft. to 10 ft. diameter.



SELF-ACTING PLANING MACHINE.

SELF-ACTING PLANING MACHINES, with grooved table worked by screw, which gives a smooth and even motion; driving pulleys and gear placed at the end of the bed.

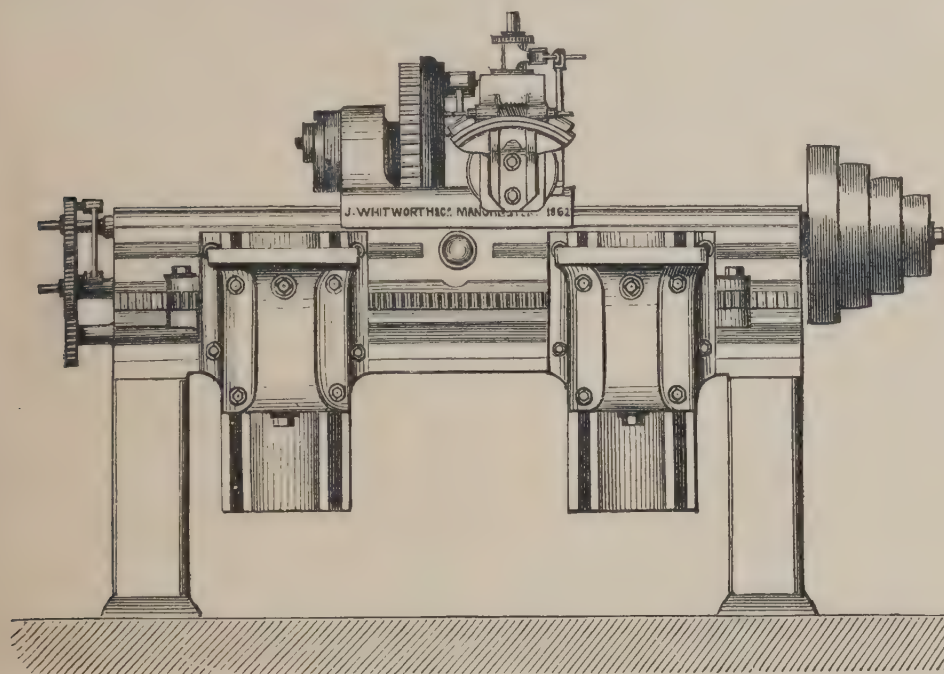
These machines have self-acting motions for horizontal, vertical, and angular planing. Two of them are exhibited, namely, one E size, 22 ft. long, 5 ft. 6 in. wide, 5 ft. 6 in. high, provided with 2 reversing tools, each to plane both ways.

The other machine is smaller, being a C size, 9 ft. long, 3 ft. 6 in. wide, 3 ft. 6 in. high, and is provided with one tool holder and planes only one way, the table having its

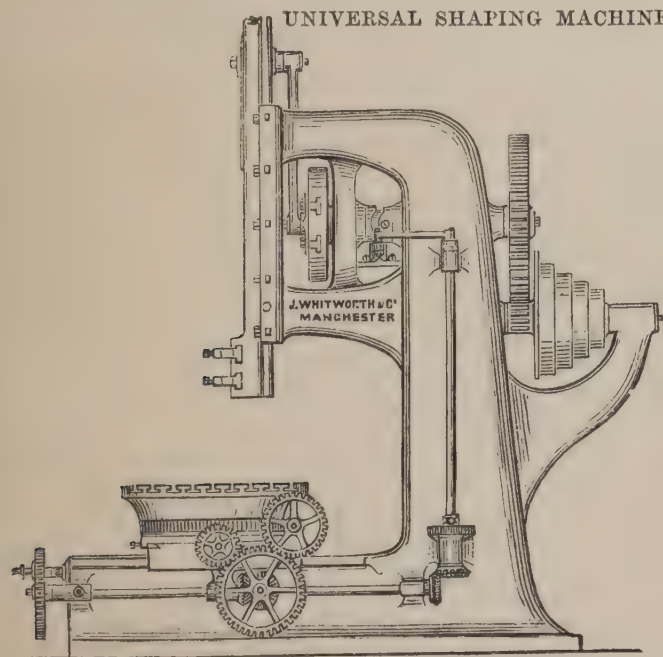
return traverse motion increased to nearly 3 times the cutting traverse.

The sizes manufactured are designated A, B, C, D, E, F, G, H, and I sizes. They vary according to the width and height of the object they will plane, namely from 18 in. by 18 in. up to 14 ft. by 14 ft. In length they are made to suit the work to be planed, and, as a general rule, will plane three-fourths of the length of their bed.

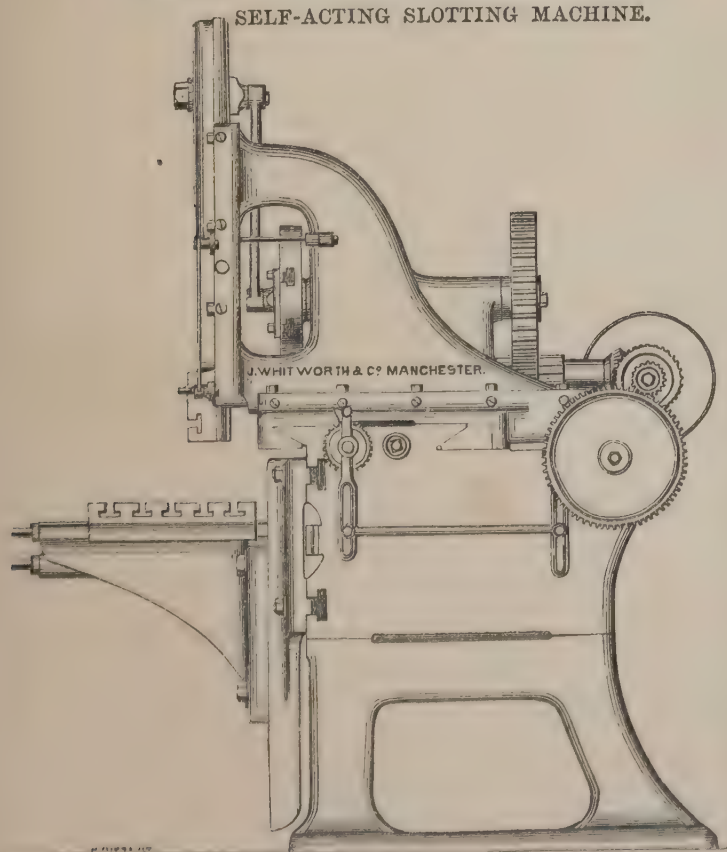
A CRANK PLANING MACHINE is also exhibited, in which the table is worked by a crank and lever, which imparts a uniform motion in cutting and a rapid one in returning.

WHITWORTH, JOSEPH, & Co., *continued.*

UNIVERSAL SHAPING MACHINE.



SELF-ACTING SLOTTING MACHINE.



SELF-ACTING COMPOUND SLOTTING MACHINE.

PATENT UNIVERSAL SHAPING MACHINES, for shaping levers, cranks, connecting rods, and for work in general.

They have adjustable crank motion, self-acting motions for horizontal, vertical, angular, and circular work, and for internal curves. The tool-holder is provided with a segment wheel and worm, to which a self-acting motion is attached.

These machines have two independent tables for holding the work, which are adjustable vertically by means of screws and nuts, and longitudinally by means of racks and pinions. They are attached to the machine in front by bolts sliding in planed T grooves.

There are several sizes of these machines made, viz. A, B, C, D, E, F, G, H, I, and J sizes. The stroke of the tool varies from 5 in. in the A size to 42 in. in the J size, and the lengths of the bed from 3 ft. to 18 ft. respectively.

The two sizes exhibited are B and F.

The larger sizes, viz. C, D, E, F, G, H, I, and J sizes, are sometimes provided with two headstocks adjustable independently, and with independent self-acting motions. In this case three tables are usually provided, and the bed is made of any length, to suit the work to be done. This arrangement is suitable for planing or shaping both ends of connecting rods at the same time, or for general work.

SELF-ACTING SLOTTING AND SHAPING MACHINES, with independent upright framing, continuous vertical slide for tool holder, worked by a crank, table for holding the work fitted with transverse slides and a worm wheel for circular work. In some cases extra transverse slides are used for convenience of chucking and shaping work. Two sizes of this machine are exhibited, an A size, with 6 in. stroke, and a D size, with 18 in. stroke.

The small one exhibited has the extra transverse slides, and is placed on standards to bring it to a convenient height for the workman.

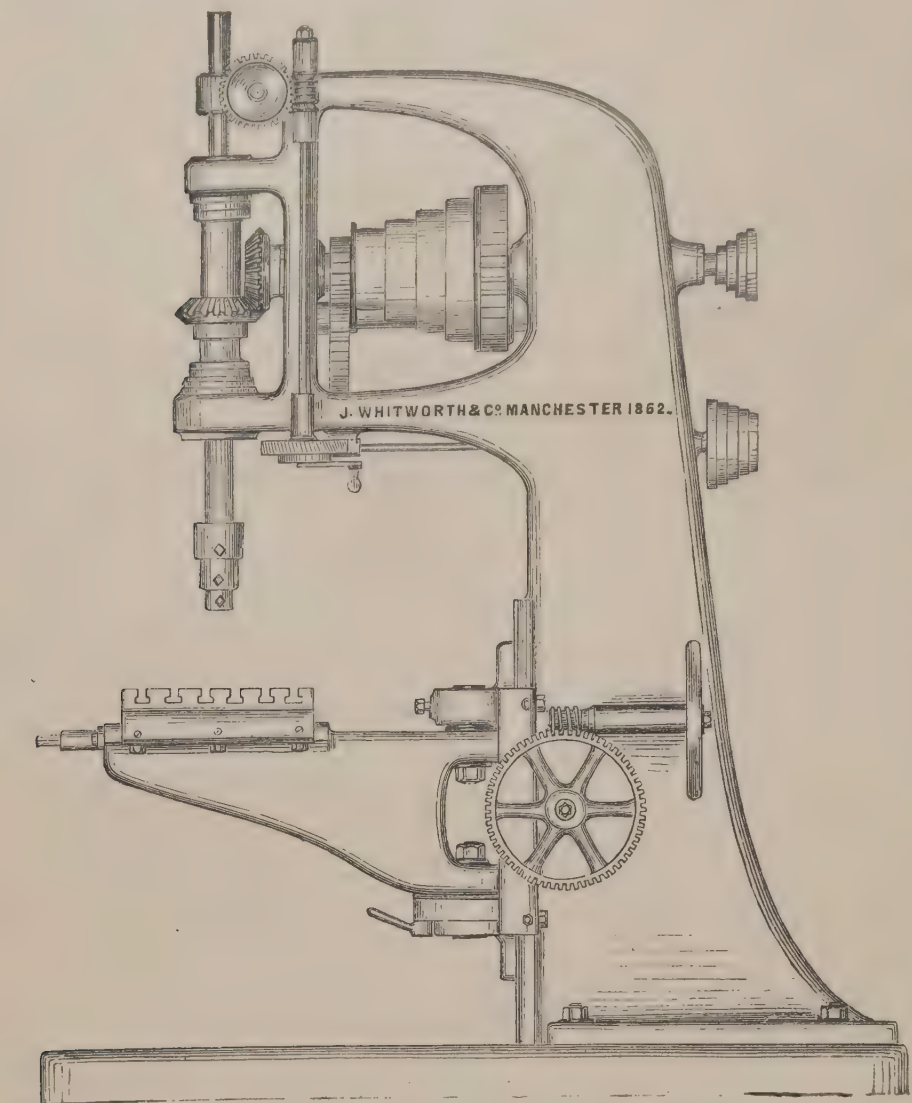
These machines are manufactured of several sizes, which are designated A, B, C, D, E, F, G, H, and I sizes.

The length of stroke varies from 6 in. in the A size, to 48 in. in the I size, and the diameter admitted from 2 ft. in the A to 10 ft. in the I size.

In the machines with stroke above 30 in. long the tool slide is worked by means of a screw with a quick return motion, and in the others by a crank.

SELF-ACTING COMPOUND SLOTTING AND SHAPING MACHINES, with one or more slotting headstocks mounted on the same slide-bed. The bed and tables of these machines are similar to those of the universal shaping machine. The work is fixed to the tables, which have vertical and longitudinal adjustments. The slotting headstocks and tools are made to slide along the bed, each tool having independent self-acting motions for plain and circular work. The several tools may be made to operate at different points of the same object at the same time, and as a general rule the work may be finished, before removal from the machine, with once fixing only.

WHITWORTH, JOSEPH, & Co., *continued.*

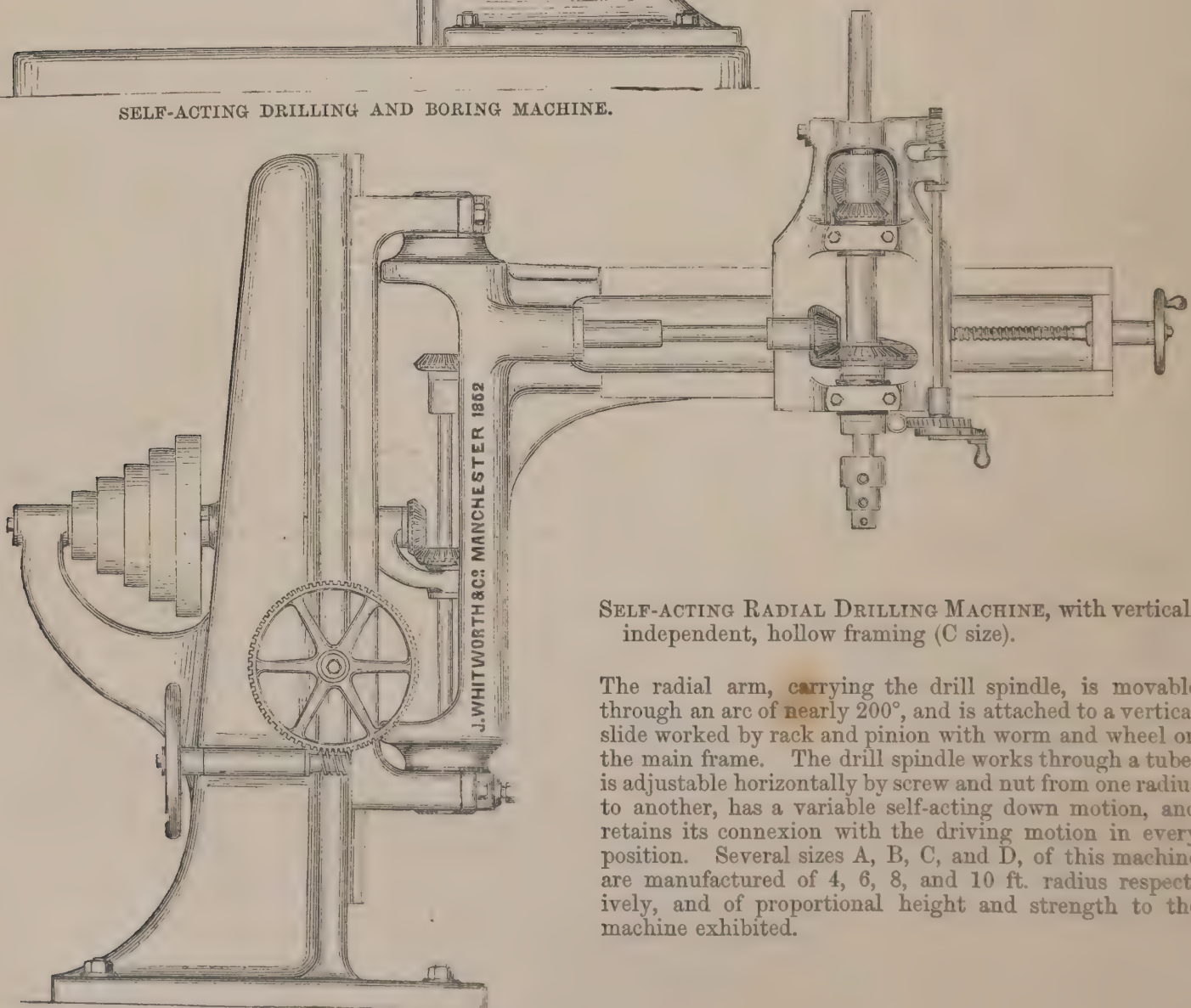


SELF-ACTING DRILLING AND BORING MACHINE.

SELF-ACTING VERTICAL DRILLING AND BORING MACHINES, each with independent hollow framing, foundation plate planed and grooved, on which work may be fixed if too high for the table.

The table is made to radiate or swivel, and also to slide to and from the machine, and has also a vertical slide. The drill spindle works vertically through a tube by self-acting means, and it may be raised or lowered by hand. Several sizes of these machines are exhibited of different capabilities. They are designated A, B, C, D, E, and F sizes. The A size will drill holes up to 1 in. diameter, and will admit objects of 24 in. diameter, and the F size will bore up to 24 in. diameter, and admit objects of 64 in. diameter.

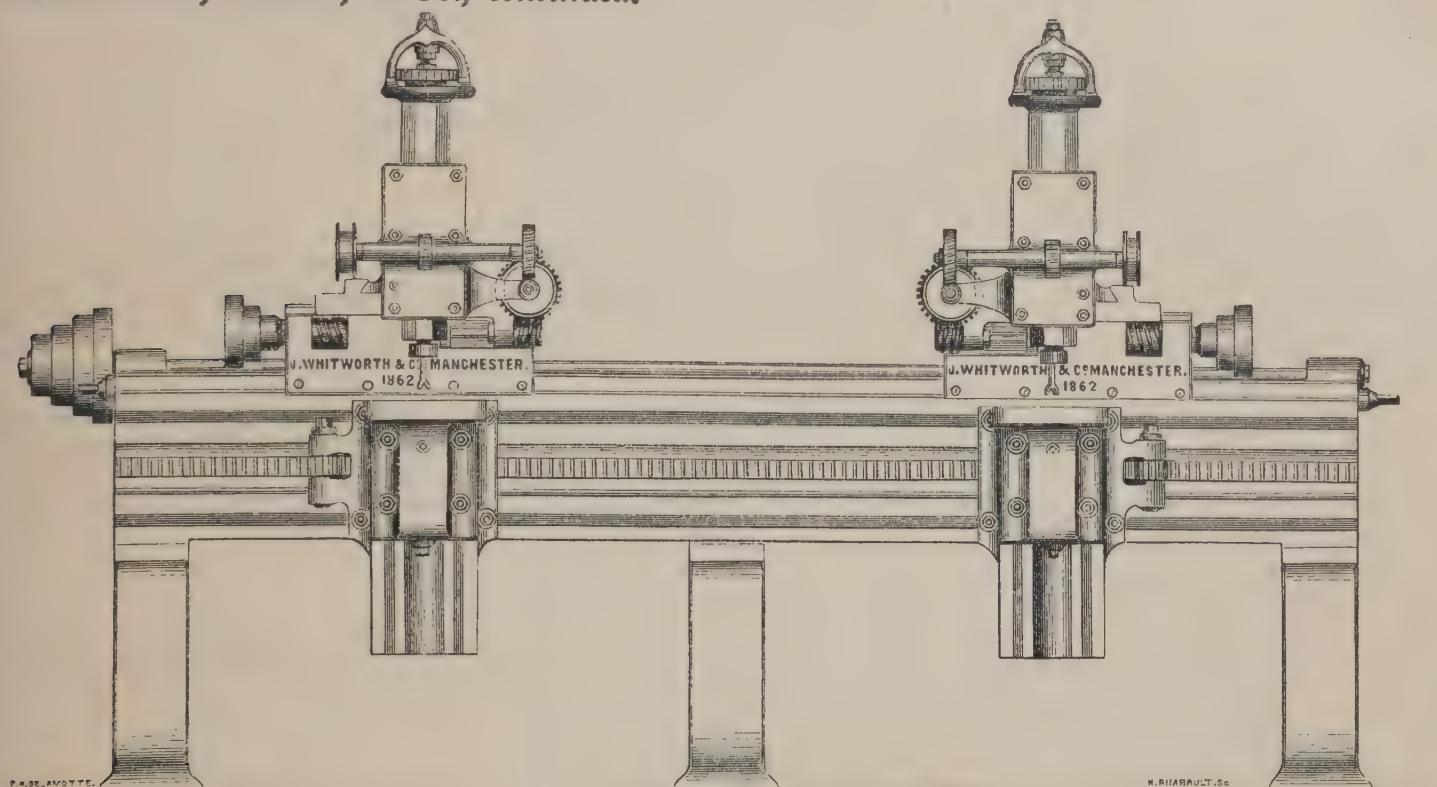
A very small VERTICAL DRILLING MACHINE is exhibited, in which the spindle is constructed like that of a lathe with conical steel bearings, and the table, which has compound slides, is moved vertically by the foot. A stop is provided to give the limit to which the table can be raised, and this stop will act as a guide in cutting mortises or slots, or in milling or shaping light work. This small machine is used for the manufacture of rifles, philosophical instruments and for performing light work in general.



SELF-ACTING RADIAL DRILLING MACHINE, with vertical, independent, hollow framing (C size).

The radial arm, carrying the drill spindle, is movable through an arc of nearly 200°, and is attached to a vertical slide worked by rack and pinion with worm and wheel on the main frame. The drill spindle works through a tube, is adjustable horizontally by screw and nut from one radius to another, has a variable self-acting down motion, and retains its connexion with the driving motion in every position. Several sizes A, B, C, and D, of this machine are manufactured of 4, 6, 8, and 10 ft. radius respectively, and of proportional height and strength to the machine exhibited.

SELF-ACTING RADIAL DRILLING AND BORING MACHINE.

WHITWORTH, JOSEPH, & Co., *continued.*

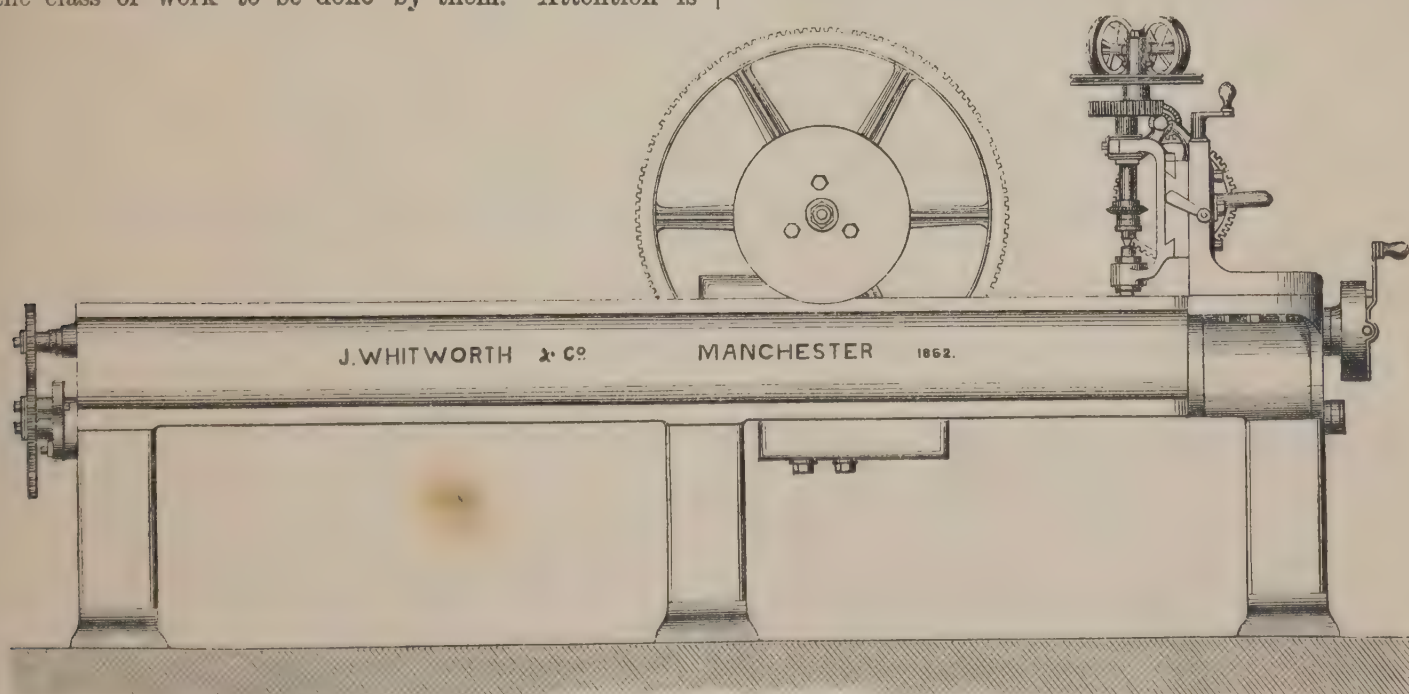
SLOT-DRILLING MACHINE.

IMPROVED SELF-ACTING SLOT-DRILLING MACHINE for cutting slots or mortises, and for general drilling, boring, and milling, constructed with horizontal slide-bed, grooved in front to receive the several tables used for holding the work, which are movable vertically and longitudinally. The drill spindle revolves in conical case-hardened steel bearings within a tube, which by preference is made octagonal in section, and is adjustable in its bearings, as in the spindle of a turning lathe.

The means for imparting both the rotary and the reciprocating actions, as well as the variable self-acting down motion to the cutter, are all contained within, and carried upon and with the main slide or headstock of the machine, which slides on the upper surface of the bed. These machines are made with one or several drilling headstocks and tables, and of various sizes, according to the class of work to be done by them. Attention is

given to the construction of the drill spindle (applicable to drilling, milling, and boring machines in general) which is designed to prevent the cutting tool from having lateral play, and consequently will produce superior work, also to the means provided for adjusting the drill spindle whilst working, both transversely and longitudinally, and for regulating the traverse of the cutter.

Another description of slot-drilling machine is made suitable for cutting slots which do not run in the direction of the length of the object, as for example in the cross head of a steam engine. The main frame carrying the drill spindle is stationary. The crank motion is applied to one of the slides of the table carrying the work, and is so arranged as to give the traverse to the table at any angle according to the direction in which the mortise has to be cut. Compound slides are provided for adjusting the work, so that when several mortises are required to be cut, it is only necessary to fix or chuck once.



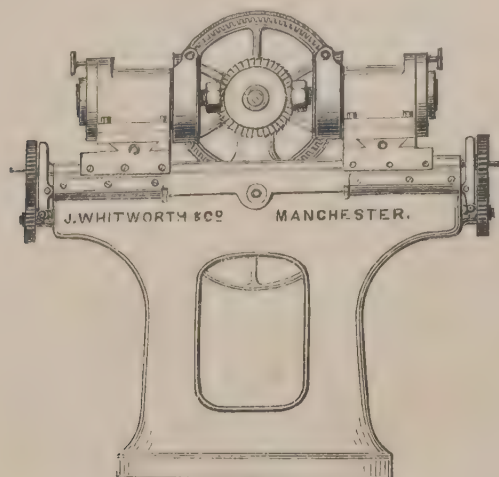
WHEEL-CUTTING MACHINE.

SELF-ACTING WHEEL-CUTTING MACHINE, to cut the teeth of spur, bevel, and screw wheels (in metal or wood).

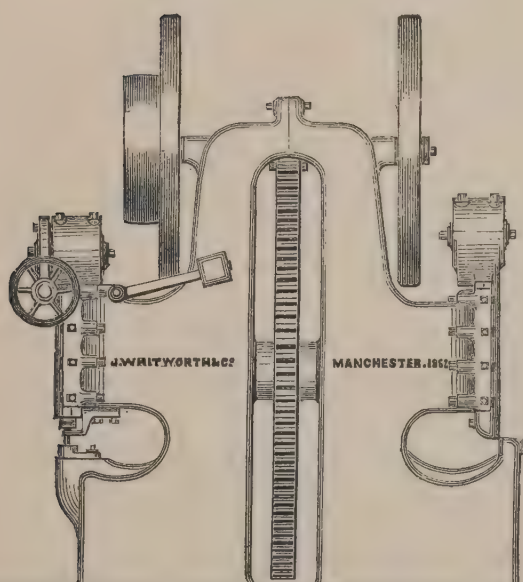
Several sizes of this machine, C, D, and E, are made, the D size being exhibited. It will cut wheels up to 10 ft. diameter, and pinions of the smallest diameter required in engineer's work. Machines of a simple de-

scription and smaller sizes, A and B, are made for cutting the teeth of spur-wheels only, in which several wheels or pinions are placed side by side on an arbor, and the cutter is traversed through them by self-acting means, the dividing being accomplished by change-wheels and worm-wheel, as in the large machine exhibited.

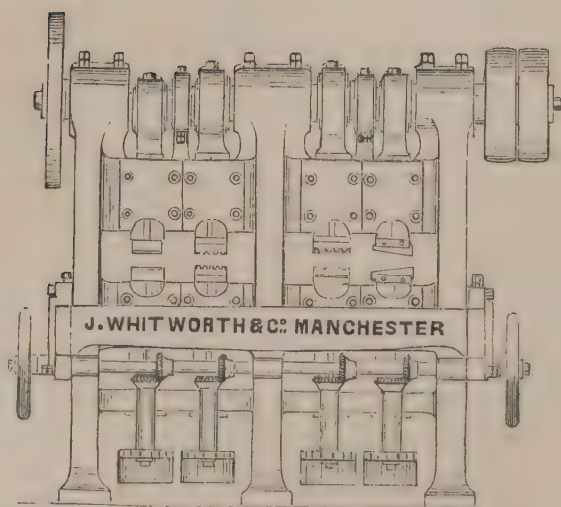
WHITWORTH, JOSEPH, & Co., *continued.*



SELF-ACTING NUT-SHAPING MACHINE.



PUNCHING AND SHEARING MACHINE.



IMPROVED "RYDER'S" FORGING MACHINE.

SELF-ACTING BOLT HEAD AND NUT SHAPING MACHINE, with two circular cutters for shaping two sides at once, two concentric chucks for holding two objects to be operated upon at the same time. Duplicate compound slide rests, with independent self-acting and self-disengaging motions, are provided to prevent injury from the cutters. The concentric chucks are placed on opposite sides of the circular cutters, by which means the forces are balanced, and double the quantity of work that could be done with only one chuck is produced.

This machine is applicable for shaping and squaring nuts, bolt-heads, ends of shafts, &c. These machines are sometimes made with single cutter and single chuck, but the machine above explained and exhibited will produce the most work.

PUNCHING AND SHEARING MACHINES, constructed with a strong hollow main framing, with large wheel and steel-iron eccentric shaft, and connecting rods for working the slides.

Both the operations of punching and shearing may be regularly going on at the same time without interfering with each other. The large wheel is driven by a pinion placed on a shaft at the top of the machine, at each end of which is keyed a fly-wheel and at one end the driving pulley. An apparatus is provided for raising the punch without stopping the machine. Sometimes "traverse tables," for holding and moving the plates to be punched and sheared, are supplied, the correct division of the holes being secured by screw and change-wheels worked from a cam on the eccentric shaft of the machine. The several sizes of these machines are A, B, C, D, and E, which will punch respectively $\frac{1}{2}$ -in. to 2-in. holes through plates of a corresponding thickness, and will shear a similar thickness of plate.

BAR-CUTTING MACHINES are also manufactured of similar design to the above, or with only one slide.

In large machines for punching, shearing, or bar cutting, a steam engine of sufficient power is attached to the main framing to work the pinion and fly-wheel shaft, and the driving pulley is dispensed with. This is convenient for machines that are situated at a remote distance from the main shafting of a workshop.

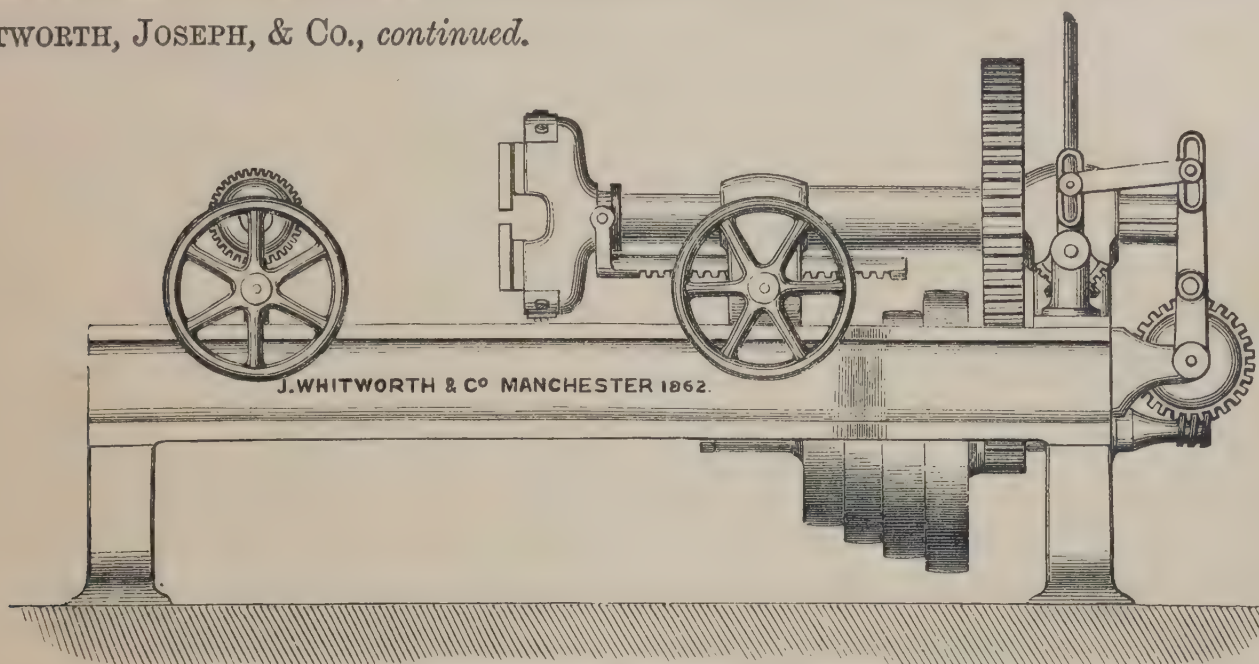
IMPROVED RYDER'S FORGING MACHINE, with strong compact framing, steel eccentric shaft, for working the upper swages, which are generally four in number.

The upper swages are depressed and raised by the eccentrics, and the springs formerly used (frequently causing inconvenience by breaking) are dispensed with. The lower swages are raised by screws and wheels to the required height, and any one or more of them may be raised during the swaging of a piece of work, so as to form taper work. These machines are applicable to the forging of small articles which are numerous, where the cost of the swages (which in general are made of cast-iron) forms a small item in proportion to the entire cost of the articles to be forged. They are made of two sizes, A and B. The machine exhibited, being the B size, will admit a piece 6 inches square.

SAWING MACHINE FOR HOT IRON. Is a useful machine in connexion with the Ryder's forging machine.

It is arranged with a slide bed, on which the slide carrying the circular saw is movable longitudinally. The iron to be sawn is placed in an angular grooved bed, and the saw is drawn through it by means of a screw and nut.

WHITWORTH, JOSEPH, & Co., *continued.*

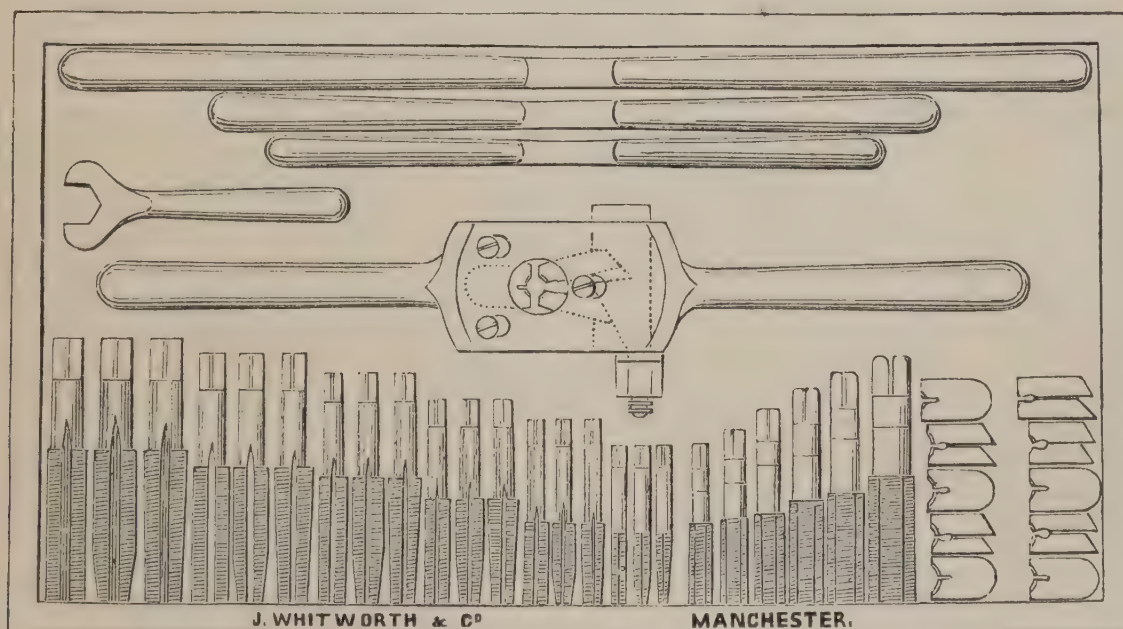


BOLT AND NUT SCREWING MACHINE.

IMPROVED SCREWING MACHINE for bolts and nuts, with hollow mandril, four radial dies, two on each side of the centre, complete set of dies and taps, with chucking apparatus for bolts and nuts.

The dies are cut by master taps, of double the depth of thread, larger in diameter than the working taps, so that the circle of the dies in contact, is the same size as the screw blank. A perfect guide is thus obtained, and a

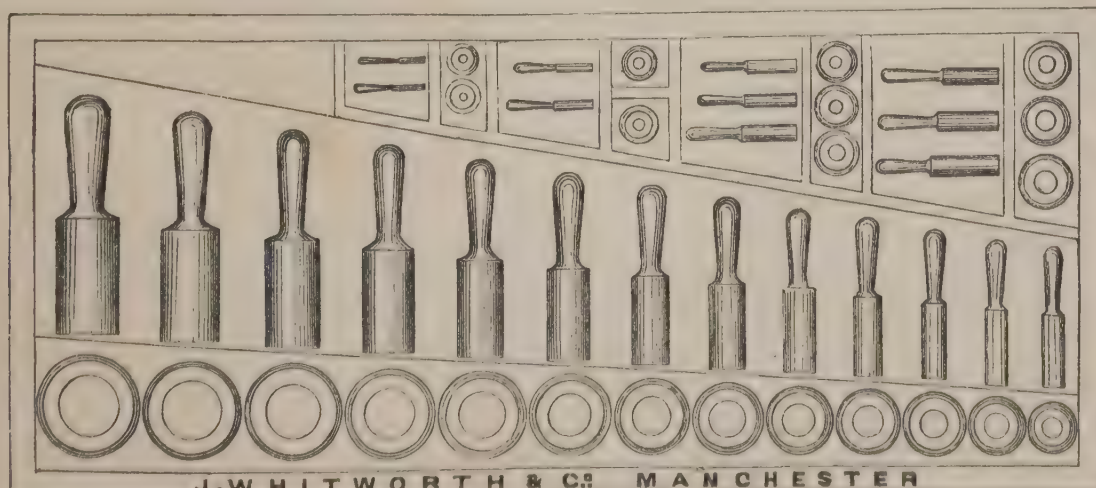
thread of correct pitch is formed at the commencement. The inner edges of the dies being filed off to an acute angle, they cut with ease without destroying the thread; and by the direction in which the dies are moved, their cutting power is preserved for the full depth of thread. Their action in cutting is similar to that of a chasing tool, which they resemble in form, and may in like manner be sharpened on a grindstone.



HAND SCREWING APPARATUS.

HAND SCREWING APPARATUS, with screw stocks, dies, taps, and tap wrenches, are furnished of all sizes to screw from $\frac{1}{16}$ in. to 3 in. diameter. The screw threads throughout are uniform in angle and shape.

INTERNAL AND EXTERNAL CYLINDRICAL GAUGES, being standards of size, are made exact to the measure of the realm and tested by the measuring machine. They are supplied in sets, in boxes, as exhibited.

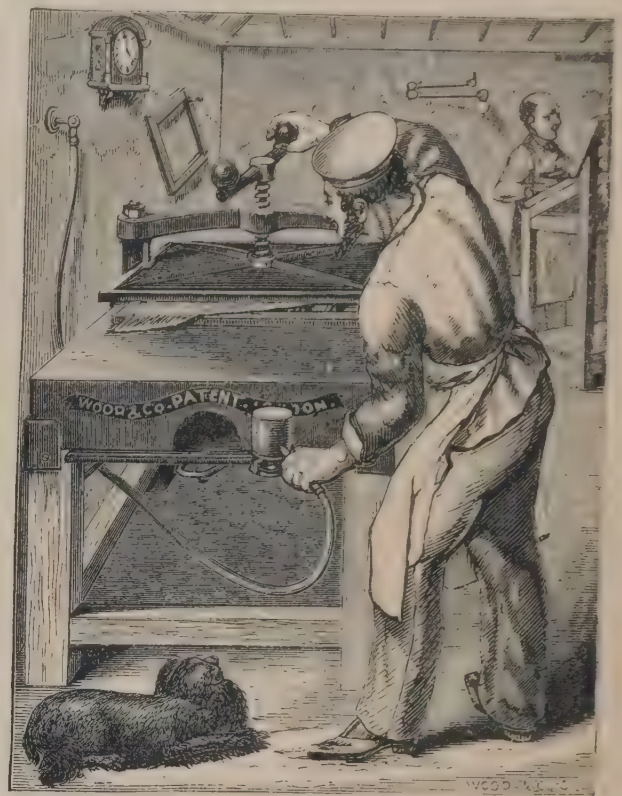


CYLINDRICAL GAUGES.

WOOD, J. & R. M., 89 West Smithfield, E.C.—Printing and stereotyping machinery, and type



MAKING THE PAPER MOULD.



DRYING THE PAPER MOULD.



OPERATION OF CASTING A STEREOTYPE PLATE.



FINISHING THE PLATE FOR PRESS.

IMPROVED PAPIER MACHÉ STEREOTYPING APPARATUS, patented September 8th, 1860. No. 2180.

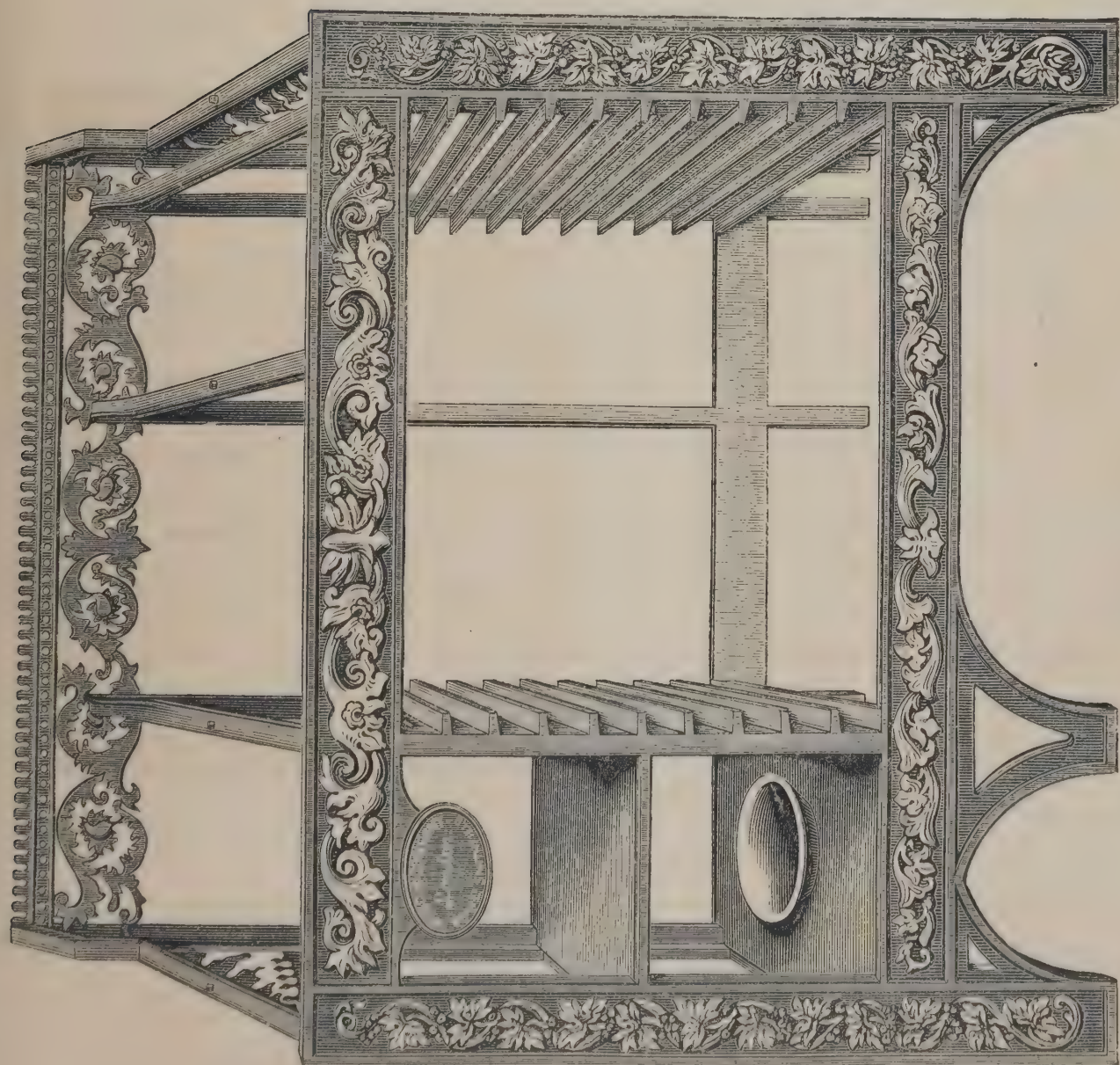
Prices of J. & R. M. Wood's stereotype foundries.

To cast a demy plate, and under	£20	0
To cast a quarto royal or folio crown	25	0
To cast a royal folio	35	0
To cast, type high, a newspaper, single and double columns, with Wood's patent core gauge	40	0

To cast a newspaper page, flat, size of the "Times" £135 0

The exhibitors are type founders, Columbian and Albion printing press manufacturers, and patentees of the improved papier maché stereotyping apparatus. They are prepared to execute orders for printing machinery, plant, and material, and every requisite for printing newspapers, books, and jobbing.

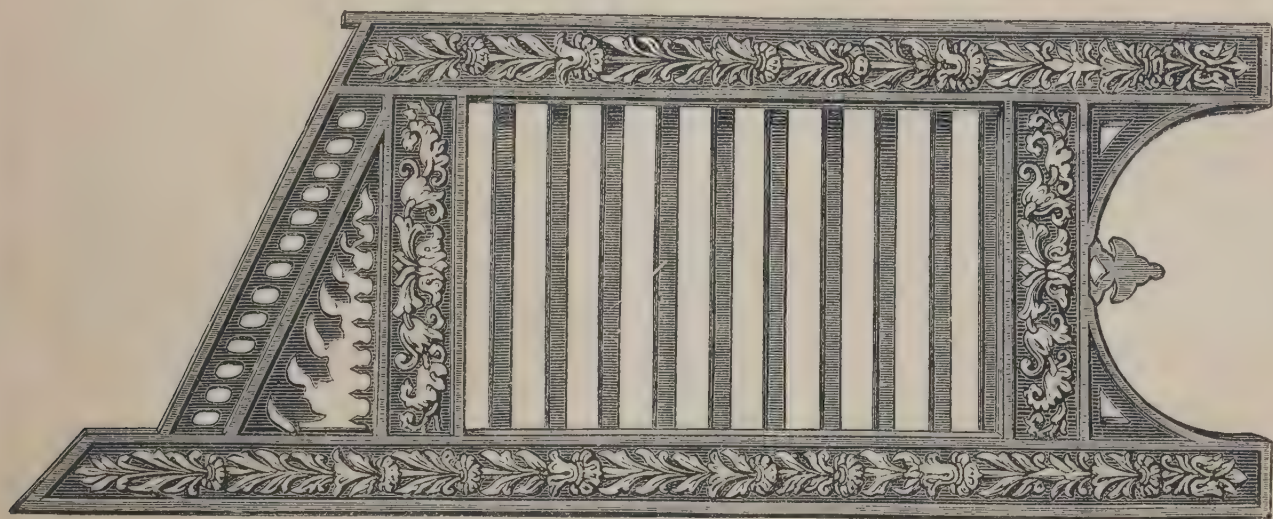
WOOD, J. & R. M., *continued.*



FRONT VIEW.

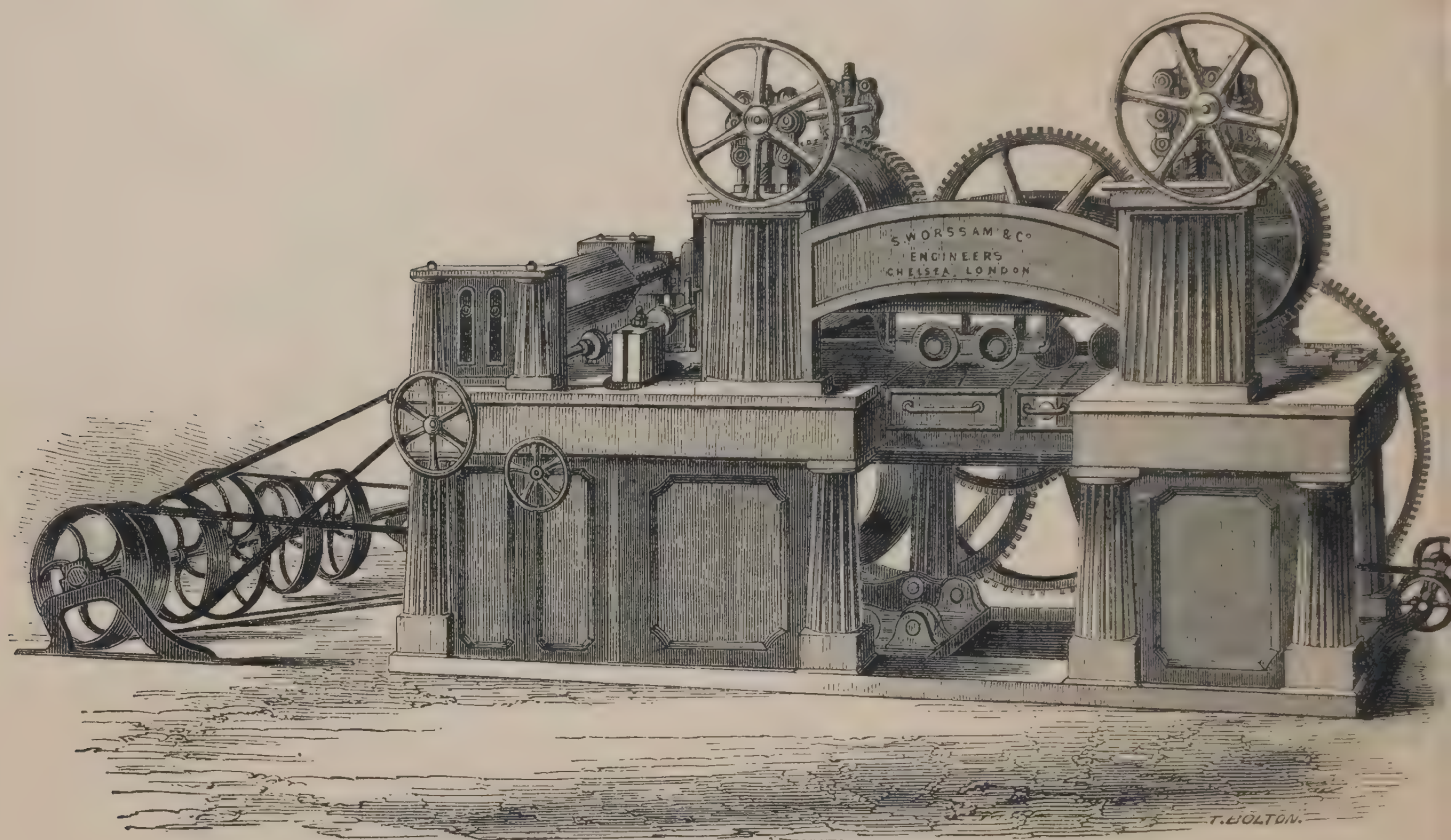
COMPOSITOR'S FRAME AND RACK IN IRON,

With galley shelf and enamelled iron basin for wetting type for distribution.



END VIEW.

WORSSAM, SAMUEL, & Co., 304 *King's Road, Chelsea, S.W.*—Machines for sawing, planing, moulding, mortising, tenoning, grooving, rabbeting, &c.



ROLLER PLANING MACHINE.

MACHINES IN FULL OPERATION.

PLANING MACHINE with roller feed for planing floor boards, deck plank, &c. This machine will plane, groove, tongue, edge, and thickness at one time, boards of 13 in. wide by 6 in. thick at one operation, at the rate of 50 feet a minute.

PATENT PORTABLE DEAL FRAME, for sawing at one time two deals of 14 in. wide by 4 in. thick, into thin boards. This frame is supplied with an air cylinder which takes the weight of the swing frame and saws, and prevents the necessity of a counterbalance on the fly wheel. It requires no excavations, and works entirely above the floor. It is fitted with S. Worssam & Co.'s patent silent feed.

THE GENERAL JOINER, for sawing, grooving, tonguing, rabbeting, moulding, tenoning, boring, cross-cutting, and squaring off, &c. &c.

PATENT MORTISING MACHINE with square hollow chisel, and auger working inside.

IMPROVED MOULDING MACHINE with top and bottom and one side cutter, for working mouldings of any pattern.

SMALL TENONING MACHINE with upright saw spindle for cutting double tenons, and sliding plate fitted with spring stops.

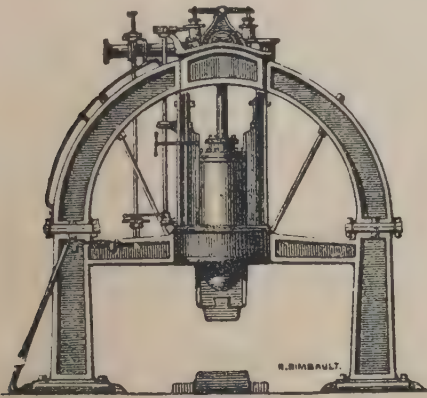
TOOLS.

A 7-ft. best cast-steel circular saw.
Set of Wilson's patent cylindrical gouges.
Set of patent augers.
Set of band saw blades.
Selection of plane irons, tenoning cutters, &c.

DRAWINGS.

Patent timber frame with cylinder overhead.
Ditto ditto to drive from below.
Patent double timber frame (for Russia).
Patent planking frame.
Patent double-deal frame.
Veneer saw.
Improved band saw machine.
Fret saw.
Large rack circular saw bench.
Small ditto ditto.
Combined rack bench and band saw.
Sleeper saw bench.
Self-acting saw bench.
Plain saw bench.
Double-edging bench.
Grooving and rabbeting bench.
Patent timber cross-cut saw.
Ransome's pendulum cross-cut saw.
Improved scantling ditto.
Rabbeting, grooving, and chamfering machine.
Planing, surfacing, and squaring-up machine.
Whine's patent dovetailing machine.
Boring machine.

WYLIE, ALLAN C. (Successor to JOHN CONDIE), 8 Cannon Street, London.—Two Condie's patent steam hammers.



CONDIE'S PATENT DOUBLE-ACTING STEAM HAMMER.

The novelty and utility of this invention consists in the introduction of the steam into the hammer block, which also acts as the steam cylinder. By this simple and compact arrangement, the liability to breakage of the piston and piston-rod are avoided, these being the evils so much complained of in all other forms of steam hammers. These hammers are all constructed of the best materials and workmanship, and with Musgrave's improved arrangement of double-action and valve gearing. They are extensively used throughout Great Britain and Ireland; also, in Russia, Prussia, Austria, Belgium, Holland, Oldenburg, Bremen, Spain, Brazils, United States, Canada, East Indies, Australia, and in the arsenals and dockyards of the English, French, Russian, and Austrian Governments.

TESTIMONIALS.

From Messrs. J. Schultze & Co. Engineers, Oldenburg, Germany.

"JOHN CONDIE, ESQ.

"DEAR SIR,—In reply to your inquiry concerning the 30-cwt. steam hammer we received from you in 1852, we have much pleasure in stating that the same has been constantly working since that time for 5 puddling furnaces, and making forgings for heavy machinery. It has never been out of order, or required any repairs. In one word, we consider your hammer the most perfect machine of the kind that can be constructed.

"Believe us, dear sir, yours truly,
"J. SCHULTZE & CO.

"Varel, Oldenburg, June 20, 1856."

From H. W. Harman, Esq. C.E., Marine Engineer, Northfleet, Kent.

"JOHN CONDIE, ESQ.

"DEAR SIR,—I beg to state that both the 10-cwt. and 30-cwt. patent steam hammers supplied to Mr. Pitcher, and erected here, have given me every satisfaction. In a time of pressure they enabled us to execute an immense amount of work in a very short period, their excellence consisting in the simplicity of the details, and their consequent non-liability to derangement. In our case boys work them, and this, coupled with a minimum of wear and tear, insures us two most economical and efficient machines.

"I am, dear sir, very truly yours,
"H. W. HARMAN, C.E.

"Steam Factory,
Northfleet Dockyard, Kent,
August 21, 1856."

From the Glasgow Iron Company, Glasgow.

Works. { Glasgow Iron Works, Glasgow.
Motherwell Iron Works, Motherwell.

"We have had a 50-cwt. Condie's patent steam hammer at work for 5 years; a 40-cwt. hammer for 4 years; and

we have had other two 50-cwt. hammers erected and set to work within the last 6 months, all of which have given us the greatest satisfaction. We shingle puddled balls, scrap blooms, and slabs with them, and we find them most excellent machines for all these purposes. They are easily kept in repair, and at very little expense, and they are a great contrast, in these respects, to the metal helves we have had in use previously. We have another 50-cwt. hammer getting ready by Mr. Condie, which will supersede the last of our metal helves.

"ROBERT CASSELS.

"23 St. Enoch Square, Glasgow,
June 5, 1857."

From George Blaxland, Esq. H. M. Dockyard, Sheerness.

"JOHN CONDIE, ESQ.

"DEAR SIR,—In reply to your inquiry, the 50-cwt. steam hammer supplied and erected by you 12 months ago, has given most entire satisfaction, without any derangement of the parts. The foreman of the engine smithery department, having had many years' experience with steam hammers, affirms that yours is the most efficient he has ever used.

"I am, dear sir, yours truly,
"GEORGE BLAXLAND,
"Chief Engineer.

"Steam-engine Factory, Sheerness,
March 25, 1858."

From the North London Railway Company, Bow Road, London.

"JOHN CONDIE, ESQ.

"DEAR SIR,—I am happy to say the 10-cwt. steam hammer you made for this company about 2 years ago has given very great satisfaction. It has worked uniformly well since it was first started, and has required scarcely any repair. I consider it in every way a first-rate machine.

"Yours truly,
"W. ADAMS.

"North London Railway,
Locomotive Department, Bow Road Works,
November 22, 1859."

From Alex. Fulton, Esq., Glasgow Forge.

"JOHN CONDIE, ESQ.

"DEAR SIR,—In reply to your favour of the 2d instant, the 50-cwt. hammer erected in 1856, 7-ton hammer erected in 1857, and 4-ton hammer erected in 1858, have given me every satisfaction, and I consider them, from long experience with various hammers, the most perfect I have yet seen. The large working space between the framing of the 4-ton and 7-ton hammers, enables us to execute the heaviest class of forgings with great ease, and their general design have been much admired by all who have seen them. The 40-cwt. shingling hammer recently erected, will, I have no doubt, please equally well.

"I remain, dear sir, yours truly,
"ALEX. FULTON.

"Glasgow Forge,
Scotland Street, Glasgow,
October 8, 1859."

Prices, drawings, &c. on application to Allan C. Wylie, successor to John Condie, Unity Buildings, 8 Cannon Street, London, E.C., or to Messrs. John Musgrave & Sons, engineers, iron founders and boiler makers, Globe Iron Works, Bolton, Lancashire.

YOUNG'S PATENT TYPE COMPOSING AND DISTRIBUTING MACHINE COMPANY (Limited),
77 Fleet Street.—Type composing machine, and type composing and distributing machines.

For some time past the necessity of discovering a means for increasing the speed of setting-up types, and superseding the present slow hand method, has been strongly felt.

While printing from the composed types has, by the improvements in the steam press, been carried to a most advanced stage, setting-up by hand is not now done more quickly than it was 400 years ago by the earliest printers. In order to save a few minutes' time in printing, large sums are paid for improved steam presses, when much more time might be saved by the use of a well-devised composing machine.

The type-composing machine invented by the late Mr. James Hadden Young accomplishes this object completely, as a single example in reference to its use by a daily newspaper will show.

Let it be supposed that half an hour before the usual time of putting to press important news arrives, enough to extend over three columns of the paper, or say 45,000 types have to be set up in thirty minutes by hand: this would require the assistance of ninety compositors, each having a scrap of paper put into his hand to set up in such a manner that it may tally with his neighbour's piece, technically called "making even." With the machines, the work would be done in the same time by six players and twenty-two justifiers, therefore, only six pieces of copy, instead of ninety, would be required, and the system would besides, offer immense facilities for correction.

It must be remembered, too, that for this very work steam presses are waiting to throw off copies at the rate of 20,000 per hour, so that the saving of only five minutes would be a gain of 1,500 copies.

Mr. James H. Young's type-composing machine fulfils all the conditions necessary to make it of practical utility. It is simple, durable, not likely to get out of order, and causes no damage to the type. It is provided with separate keys for all the letters of a fount, to admit of each letter being set up in the order required by the compositor's copy, with a speed which is only limited by the skill of the player. In reference to this it will suffice to say that the present ordinary speed is at the rate of 12,000 to 15,000 types set up in an hour's time. The

art of playing the machine can be easily acquired by any compositor after a few weeks' practice.

As the type-composing machine sets up the type in long lines, they require previous to going to press to be put in page. For this purpose Mr. Young invented his

JUSTIFYING APPARATUS, which is intended to replace the compositor's stick, which, however, it resembles. It is fixed to a frame, and is used as follows:—The compositor places the galley filled with the long lines set up at the composing machine. He slides one of these lines into the apparatus, divides it into the proper length, reads it, makes any obvious corrections, and having justified it, he moves a handle, by which the completed line is depressed, and room is made for a succeeding line. It is found that a compositor can justify at the rate of 4,000 types per hour, and the calculations of saving are founded on this rate, but it is probable that a rate of from 5,000 to 6,000 will be reached. So that if 12,000 types are set up by a player in an hour, three justifiers, as now, will nearly simultaneously have prepared that quantity for the reader.

Mr. James H. Young also invented a DISTRIBUTING MACHINE, which, besides collecting the different types of the same character together, sets them up in rows ready for the composing machine.

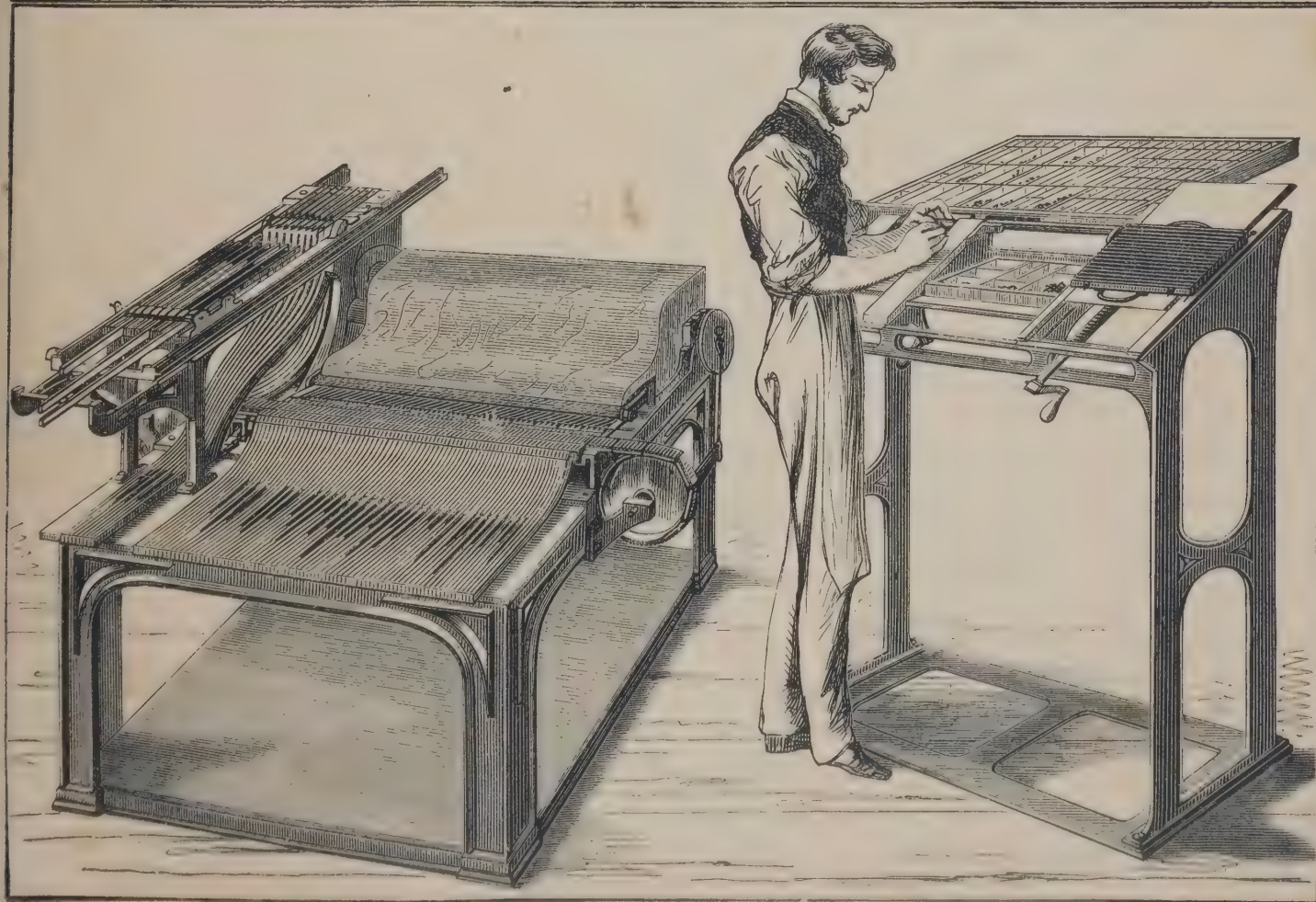
This operation is effected by means of distinguishing nicks cast or cut in the type.

In Mr. Young's distributing machine 71 per cent. of the types require only a single nick—a very shallow one—not larger than those now used to distinguish different founts; 20 per cent. have two nicks, and the remaining that require more are, for the most part, thick-bodied types. The machine, attended by two lads, will prepare upwards of 18,000 types per hour, and, if desired, this quantity may be doubled simply by increasing its size.

It is calculated that by the use of Mr. Young's type composing and distributing machines 50 per cent. is saved in the cost of composition.

Young's Patent Type-Composing and Distributing Machines Company (Limited),

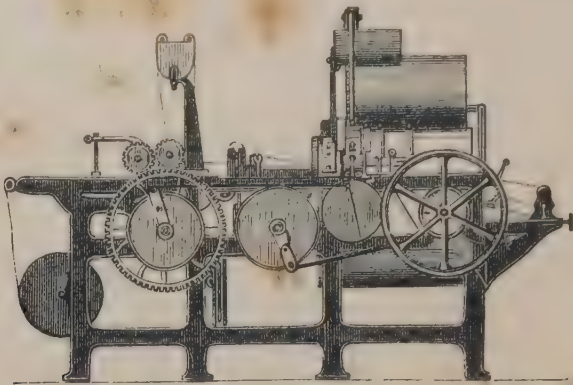
WILLIAM YOUNG, Manager, 77, Fleet Street, London.



JAMES H. YOUNG'S TYPE COMPOSING AND DISTRIBUTING MACHINES.

[1751]

YOUNGMAN, CORNELIUS TIPPLE, 25 *West Street, Victoria Street, E.C.*—Paper bags made by patent steam machinery.



MACHINE FOR MAKING PAPER BAGS.

PATENT MACHINE for making paper bags by steam power.

The machine makes a bag from a continuous length of paper, folding, pasting, cutting, and finally turning out a perfect bag without the use of hand labour.

C. T. Youngman can supply paper bags made by patent steam machinery at the following prices per cwt. :—

Brown	from £1 8 to £1 14
Grey royal hand	from 1 4 to 1 10
Purple royal hand. . . .	from 1 11 to 1 14

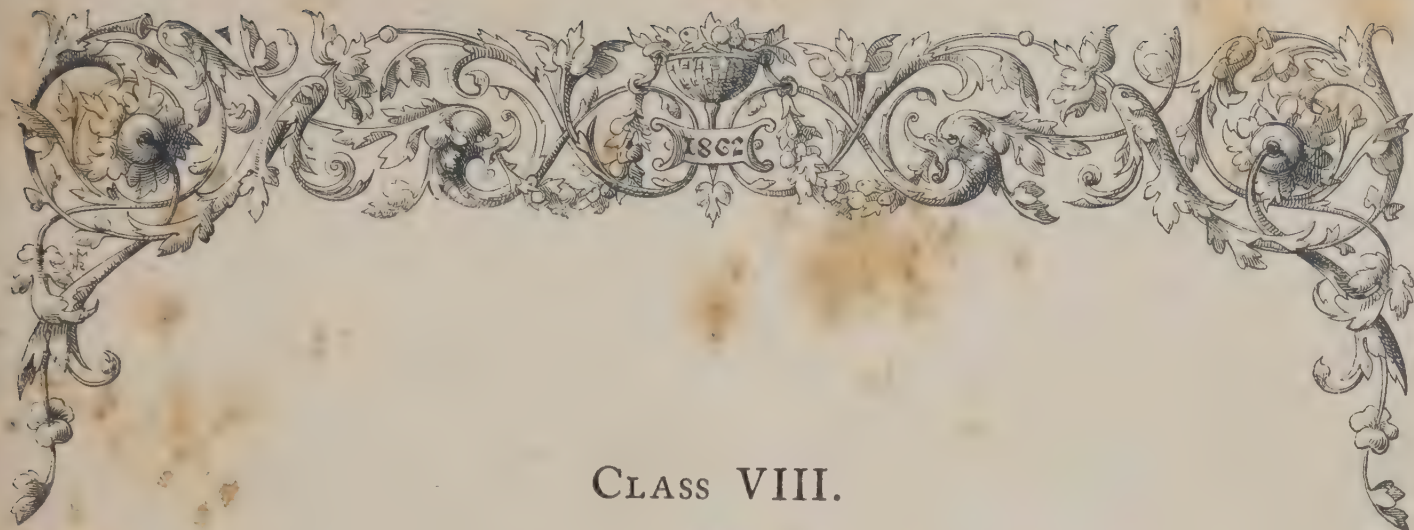
	<i>per cwt.</i>
Glazed purple hand	£2 0
Tea	from £2 16 to 3 1
Small hand	from 2 16 to 3 6

The above are also made in cone or conical shape.

He also makes bottle bags for wine merchants and publicans, and bags of any description to order.

A trial will prove the cheapness and superiority of these bags over those made by hand. Samples will be sent on application.





CLASS VIII.

MACHINERY IN GENERAL.

[1780]

ADAMSON, DANIEL, & Co., *Newton Moor Iron Works, near Manchester*.—Twenty tons hydraulic lifting-jack ; and small patent steam boiler.

ADAMSON'S PATENT HYDRAULIC LIFTING-JACKS, of twenty, sixteen, ten, eight, and six tons power.	ful, and light. One man using them, can lift as much as four men with the screw jack, and in much less time.
These jacks are entirely self-contained, portable, power-	They are made to lift from 4 to 50 tons weight.

[1781]

ADCOCK, JOHN, *Marlborough Road, Dalston, London*.—Carriage odometer, or improved distance indicator for wheel carriages.

[1782]

ALLEN, HARRISON, & Co., *Cambridge Street Mills, Manchester*.—Gun-metal fittings for marine, locomotive, and stationary engines.

[1783]

APPLEBY, BROTHERS, 69 *King William Street, City, London*.—Steam cranes ; vertical and horizontal engines ; wheels ; pumps. (*See page 2.*)

[1784]

ARMSTRONG, ROBERT, *North Woolwich, E.*—A vertical steam boiler, model, and drawing.

[1785]

ARMSTRONG, SIR W. G., & Co., *Elswick Engine Works, Newcastle-upon-Tyne*.—Models exhibiting Armstrong's hydraulic system.

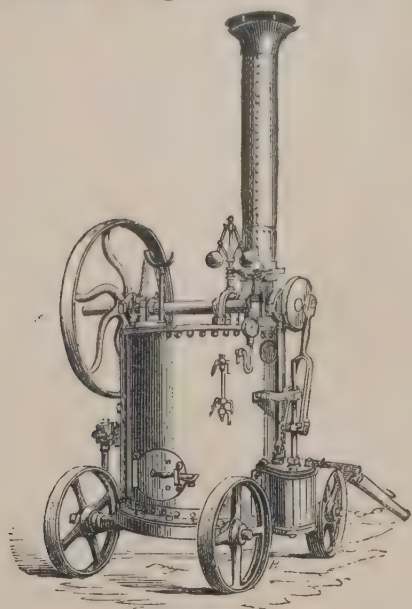
[1786]

ASHTON, J. P., 2 *Upper Holland Street, Kensington*.—Steam engine and hoist.

[1787]

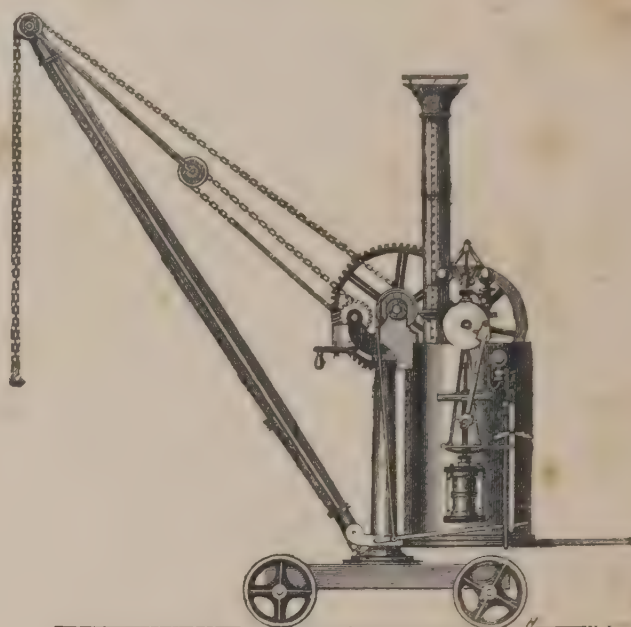
ASKEW, CHARLES, 27½ *Charles Street, Hampstead Road, N.W.*—Improved brewers' circular refrigerator, circulating boiler, and chimney cowl.

APPLEBY, BROTHERS, 69 *King William Street, City, London.*—Steam cranes; vertical and horizontal engines; wheels; pumps.



PORTABLE ENGINE.

- C. J. APPLEBY'S IMPROVED PORTABLE ENGINE, complete as shown in the illustration, or mounted on circular tank, for fixing on boarded or other floors. Price, 3-horse power £75 0
If without wheels or circular tank, £5 less.
- C. J. APPLEBY'S IMPROVED PORTABLE STEAM CRANE, to swing in any direction, and lift 2 tons . . . £185 0
Larger sizes or wharf cranes to order.
- C. J. APPLEBY'S HORIZONTAL ENGINE WITH MULTITUBULAR BOILER, the whole on feed water tank, and requiring neither brick-work for fixing, nor chimney stack. Price, 4-horse power £145 0
With Cornish boiler £35 less.



PORTABLE STEAM CRANE.

- CIRCULAR SAW BENCH, with planed iron top, fitted with 24-in. saw, improved adjustable fence, iron standards, fast and loose pulley, &c. Price £17 10
- PORTABLE CRANE to swing in any direction, to lift 3 tons £45 0
- WHARF AND WAREHOUSE CRANES of every description.
- DOUBLE PURCHASE CRABS, with strap break, to lift 5 tons £6 15
- LIFT AND FORCE PUMPS, with Appleby's patent indestructible clacks and oscillating valves . . . £2 2
- YARD OR TANK PUMPS as above £1 5

[1788]

BAINES & DRAKE, *Glasgow.*—Engine and boiler mountings.

[1789]

BALFOUR, HENRY T., 16 *Adam Street, Strand, W.C.*—Quartz-crushing machine, and steam engine.

[1790]

BARNETT, S., 23, *Forston Street, Hoxton.*—Soda-water machinery. (See page 3.)

[1791]

BARRETT, EXALL, & ANDREWES, *Reading.*—30-horse power double-cylinder horizontal engine; high-pressure expansive condensing engine.

[1792]

BASTIER, JOHN URSIN, 19 *Manchester Buildings, Westminster.*—Patent chain-pump improved.

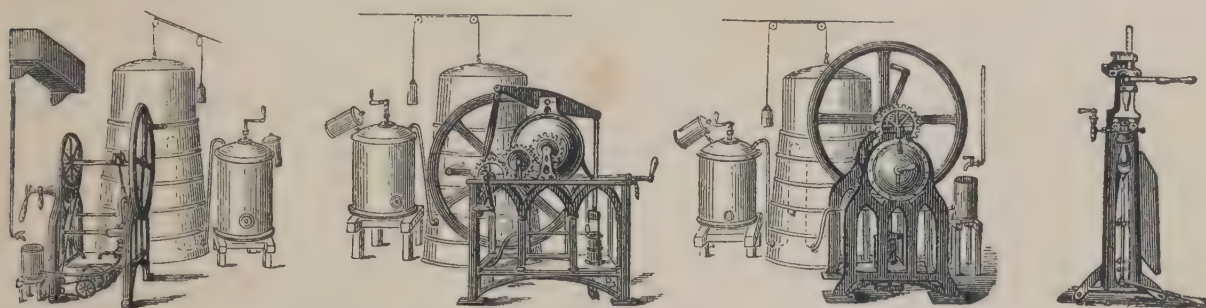
[1793]

BATE, J., & Co., 18 *Crescent, Birmingham.*—Improved bottle corking machine, machine for washing bottles.

[1794]

BAYMAN, HENRY, *Johnson Street, Old Gravel Lane, E.*—Double and single lifting jacks; a set of iron blocks; improved ship's hearth; and single winch.

BARNETT, SAMSON, 23 *Forston Street, Hoxton, N.*—Soda-water machinery.



SODA-WATER MACHINES AS PLACED FOR USE.

BOTTLING MACHINE.

There are 3 sizes of the direct and beam action machines ; their producing powers, and prices are :—

To make	200 dozen bottles per day	. . .	£75	0
Ditto	160 ditto ditto	. . .	70	0
Ditto	140 ditto ditto	. . .	65	0

There are 2 sizes of the band-action machines :

To make	120 dozen bottles per day	. . .	£55	0
Ditto	100 ditto ditto	. . .	50	0

Many of these have been in constant use for 25 years, without requiring any repairs.

DOUBLE-ACTION MACHINES, for making lemonade and soda water at the same time, or for making either separately :—

To make	400 dozen bottles per day	. . .	£150	0
Ditto	320 ditto ditto	. . .	130	0
Ditto	280 ditto ditto	. . .	120	0

A patent bottling apparatus is a very valuable addition to all the above machines, as it can be either used or not at pleasure, the usual nipple for the knee-bottling being on every machine. The advantage of the bottling machine is, that a person totally unacquainted with making aerated beverages, can, by this addition, immediately bottle it, as highly charged with gas as they please. Smaller machines are made for hotels and refreshment rooms, of the power of 60 dozen per day, £40 ; 40 dozen per day, £25 ; 30 dozen per day, £30. These machines are valuable, where the consumption is small, as the cost of the carriage is often more than making the

article itself, besides the advantage of having it always at hand, and always fresh. The improved bottling apparatus can be had separately.

The exhibitor, having had thirty years' experience in the manufacture of mineral-water machinery, and confining his attention to that and diving apparatus, every part has been the object of careful study ; and the requirements of those who use machinery where mechanical assistance cannot be obtained, have received due consideration.

The greatest purity is obtained when the condenser is lined with silver, and the plunger made of glass. The average cost of these additions is about £12, according to size.

Bottles, corks, wire, and all ingredients supplied.

Corks are usually packed in the same case, thus saving freight.

These improved soda-water machines are warranted superior to any hitherto manufactured, in solidity of construction, power, and simplicity. They are also admirably calculated for exportation, as they are packed in one case, without taking them to pieces, and can be set to work, and soda-water or lemonade made from them in half-an-hour after arrival. These machines are also used to manufacture ginger beer, orangeade, nectar, seidlitz, carrara, &c.

An illustrated pamphlet sent with each machine, containing full directions for use, and recipes for making soda water and all aerated beverages.

[1795]

BEAUMONT, FRANCIS WILLIAM, *Clapham*.—Self-acting steam boiler-feeding and general meter.

[1796]

BECK, J., 133A *Great Suffolk Street, Southwark*.—Valves for gas, water, and steam ; fire-cocks, &c.

[1797]

BELLHOUSE, EDWARD T., & Co., *Eagle Foundry, Manchester*.—Steam engine ; hydraulic pumps and cocks ; models of presses, mills, engine boiler, &c.

[1798]

BELLISS & SEEKINGS (Successors to R. Bach & Co.), *Broad Street, Birmingham*.—2½-horse power vertical steam engine. (*See page 5.*)

[1799]

BENSON, WILLIAM, *Robin-Hood Street, Nottingham*.—Steam engine on pillar, 3-horse power, new design.

[1800]

BLINKHORN, SHUTTLEWORTH, & Co., *Spalding, Lincolnshire*.—Patent fire engines, of great power, for service in the Industrial Department. (*See page 6.*)

[1801]

BODMER, R. & L. R., *2 Thavies Inn, Holborn, London*.—Safety valves, for steam boilers.

[1802]

BOTHAMS, JOHN C., *Salisbury*.—Water meter, measuring by capacity, continuous motion ; simple water meter ; high-pressure water tap, to check waste.

[1803]

BOWSER & CAMERON, *Glasgow*.—Five ton derrick crane.

[1804]

BRADFORD, THOMAS, *Manchester, and Fleet Street, London*.—Washing, wringing, drying, mangling, and knife-cleaning machinery ; drying closets ; churns. (*See page 7.*)

[1805]

BRAY'S TRACTION ENGINE COMPANY (Limited), *12 Pall Mall East, London*.—A traction engine for common roads. (*See page 8.*)

[1806]

BRIDLE, HENRY, *Bridport, Dorset*.—Patent double-action refrigerator, for brewing and distilling purposes. (*See page 9.*)

[1807]

BRIGGS & STARKEY, *Leeds and Liverpool*.—Washing, wringing, and mangling machines. (*See page 10.*)

[1808]

BROUGHTON COPPER COMPANY, *Manchester*.—Copper rollers for printing ; copper and brass tubes for fire engines, and all descriptions of copper and brass work.

[1809]

BRYANT & COGAN, *55 Broadmead, Bristol*.—Patent edge-laid leather mill-band.

[1810]

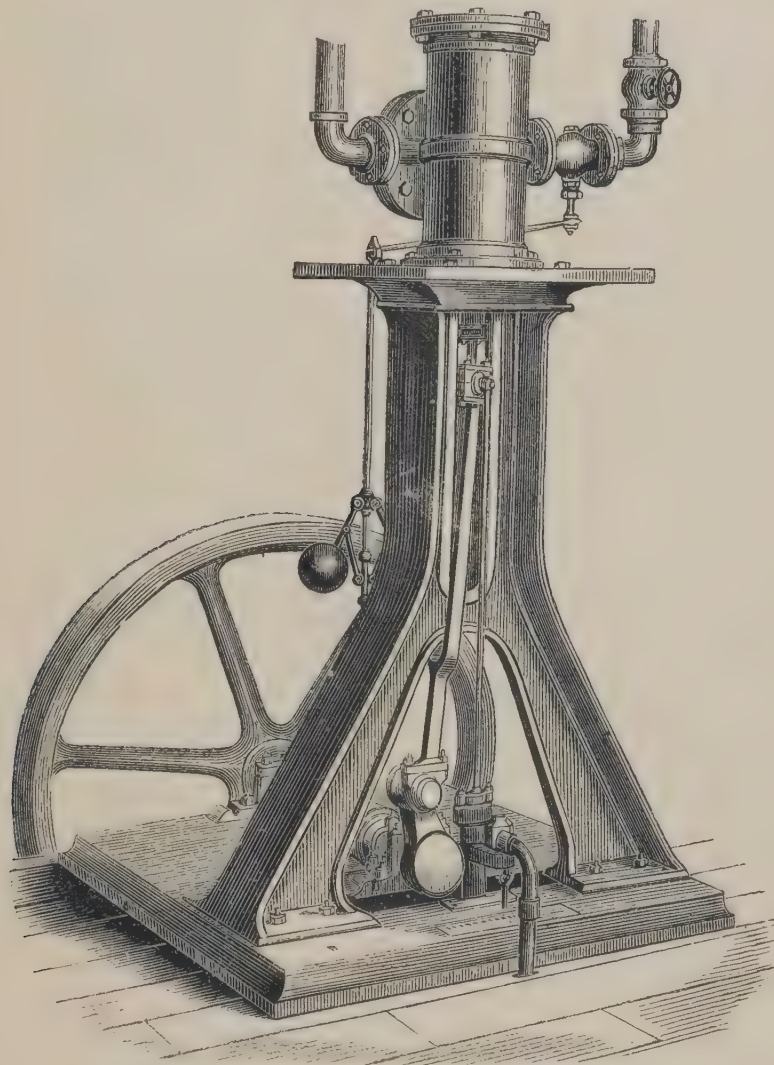
BUNNETT & Co., *Deptford, Kent*.—Concentric steam engine, working without fly wheel ; brick-making machine.

BELLISS & SEEKINGS (Successors to R. Bach & Co.), *Steam Engine and Boiler Works, 13 and 14 Broad Street, Islington, Birmingham.*— $2\frac{1}{2}$ -horse power vertical steam engine.

VERTICAL FIXED DIRECT-ACTING HIGH-PRESSURE STEAM ENGINE, with inverted cylinder 5 in. diameter, and 10-in. stroke. Nominal power, $2\frac{1}{2}$ horses.

The cylinder is carried on a cast-iron standard, which is bolted to the bed or sole plate, 2 ft. 6 in. square. To

this same sole plate, are also fixed the bearings for the crank shaft. The connecting rod and crank shaft are of the best hammered iron. The piston is fitted with steel spring, and metallic expanding packing. The cross-head is of wrought-iron, with adjustable gun-metal slide-blocks, capable of taking up the wear. The guides in



TWO AND A HALF HORSE-POWER VERTICAL STEAM ENGINE.

which they work, are truly bored in the standard itself. The pump is driven from the cross-head, and has consequently the same stroke as the piston. The governors act upon an equilibrium, or double-beat throttle-valve, through the intervention of only a single lever, and the comparative absence of resistance, renders their action peculiarly sensitive. The power is taken from the fly-wheel by means of a band. There are no extras required to render these engines complete and ready for fixing. From their simplicity of arrangement and construction they stand unrivalled in the number of purposes to which they can be applied, and their durability recommends them to the attention of all users of steam power for every stationary purpose, among which may be named, factory work, grinding, sawing, barn work, &c. for which they have been extensively adopted. The shape also is such as to pack into very little compass, being thus well

adapted to the requirements of the exporter and colonial trader.

Prices complete as above :—

$2\frac{1}{2}$ horse power . .	£34 . .	with boiler . .	£44
4 ditto . .	64 . .	ditto . .	84
6 ditto . .	90 . .	ditto . .	120
8 ditto . .	112 . .	ditto . .	152
10 ditto . .	130 . .	ditto . .	180
12 ditto . .	144 . .	ditto . .	204

Higher powers in proportion.

With the boilers are supplied all the necessary fittings, glass water gauge, safety valve, check valve, fire doors, fire bars, beam, dead-plate, and damper. The boilers can be supplied with either cylindrical, Cornish, or multitubular to suit the locality.

BLINKHORN, SHUTTLEWORTH, & Co., *Spalding, Lincolnshire.*—Patent fire engines, of great power, for service in the Industrial Department.

PRIZES AWARDED :—

Manchester and Liverpool Agricultural Meeting, held at Bolton—Silver medal.

Yorkshire Agricultural Society's Meeting, held at Pontefract—First prize.

Peterborough Agricultural Society's Meeting—Second prize.

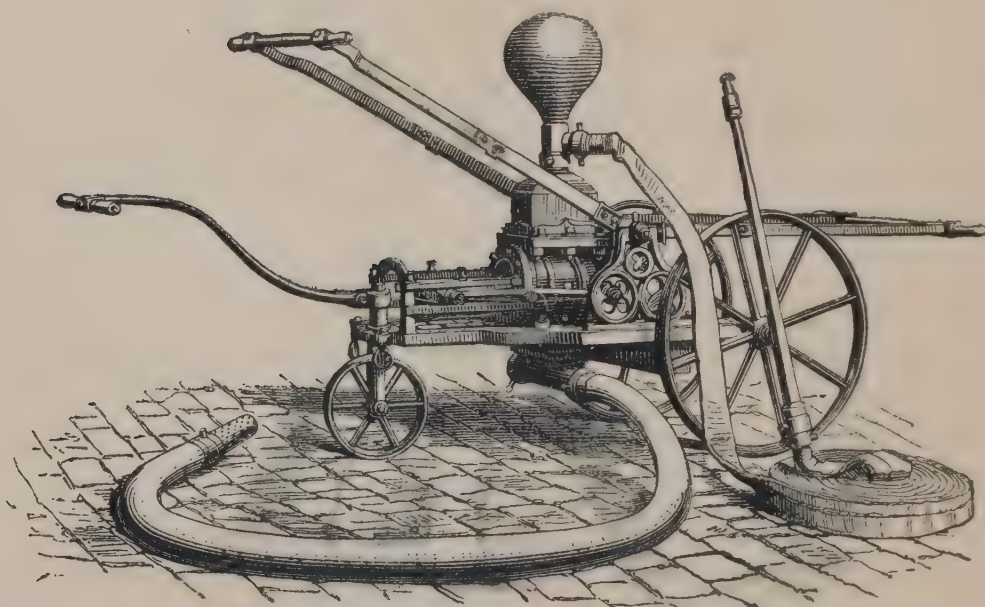
North Lincolnshire Agricultural Society's Meeting held at Brigg—First prize.

Manchester and Liverpool Agricultural Society's Meeting held at Ashton-under-Line—Silver Medal.

Agricultural Meeting held at Middleton—First prize.

Meeting of the Association of German Agriculturists and Foresters held at Schwerin, North Germany—Silver medal.

Exhibition of the Royal Cornwall Polytechnic Society held at Falmouth—Bronze medal.



FIRE ENGINE.

PRIZE PATENT HORIZONTAL DOUBLE-ACTION FARM, MANSION, OR FACTORY FIRE ENGINE. This engine will discharge 100 gallons of water per minute, to an elevation of 100 ft. weather permitting, when worked by 8 men, is of very great power, exceedingly portable, made of the most durable materials, is not likely to get out of order, and effects a saving of 50 per cent. in labour for working. Price £30. It will throw a continuous stream of water with more force, and to a greater height than the engines generally in use. It possesses a double action, and being on the horizontal principle, is not likely to foul. When worked, the cylinder is always full of water, the air is excluded, and the flow of water is consequently freer, and more regular, than from the ordinary vertical barrels. Another important feature in its construction, is the formation of inlets to the valves, which can be opened in the course of a few seconds, and any obstruction

which may take place may be removed almost instantaneously, thereby preventing the possibility of any serious delay at times when the services of an engine are imperatively necessary.

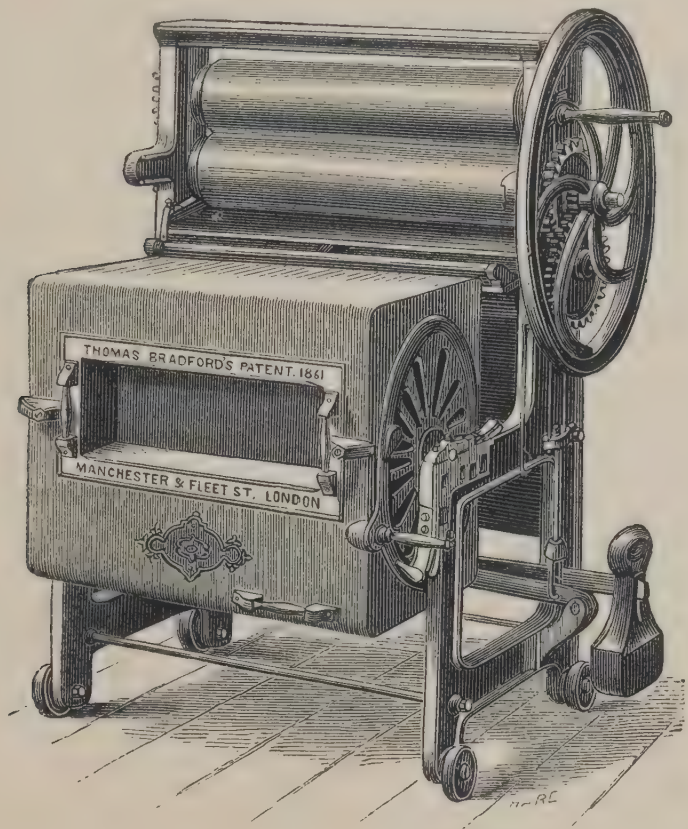
A complete set of fittings to the above, including suction and delivery hose, hose reel, branch pipe and nozzles, patent buckets, dam, &c. &c.

Size A, a smaller engine than the above, will discharge, when worked by 6 men, 70 gallons of water to an elevation of 70 feet, weather permitting.

A complete set of fittings to the above.

Full particulars, testimonials, reports of trials, and references, may be obtained of the inventors and manufacturers, Spalding, Lincolnshire.

BRADFORD, THOMAS, *Manchester, and Fleet Street, London.*—Washing ; wringing ; drying ; mangling ; knife cleaning machinery ; drying closets.



BRADFORD'S ORIGINAL COMBINED MACHINE, WITH IMPROVEMENTS PATENTED IN 1861 (see Nos. 2, 4, and 6),
Obtained every prize for which it competed (13 altogether) last year, 1861.

PATENT WASHING AND DRYING MACHINERY, LAUNDRY REQUISITES, &c.

Washing machines, original patent.		Price,
No. 1	£3	10 0
No. 3	5	10 0
No. 5	6	10 0
Washing machines, improved patent, combined with wringing and mangling apparatus.		
No. 2	£3	8 0
The most useful family machine.		
No. 4	12	12 0
Specially adapted for mansions, hotels, &c.		
No. 6	15	15 0
For large hotels or public institutions.		
No. 8	25	0 0
Fitted for steam or water power, and specially recommended for large public institutions, laundry contractors, and extensively adopted in larger sizes for various manufacturing purposes.		
No. 10	£40	0 0
Similarly constructed to the above, but with two washing compartments and double-acting rollers.		
Wringing machine or cottage mangle.		Price,
No. 0	£2	12 6
No. 1	3	3 0
No. 2	4	4 0
Portable mangle with 3 rollers.		Price,
No. 1	£5	5 0
No. 2	6	6 0
This is a really useful and very convenient mangle.		

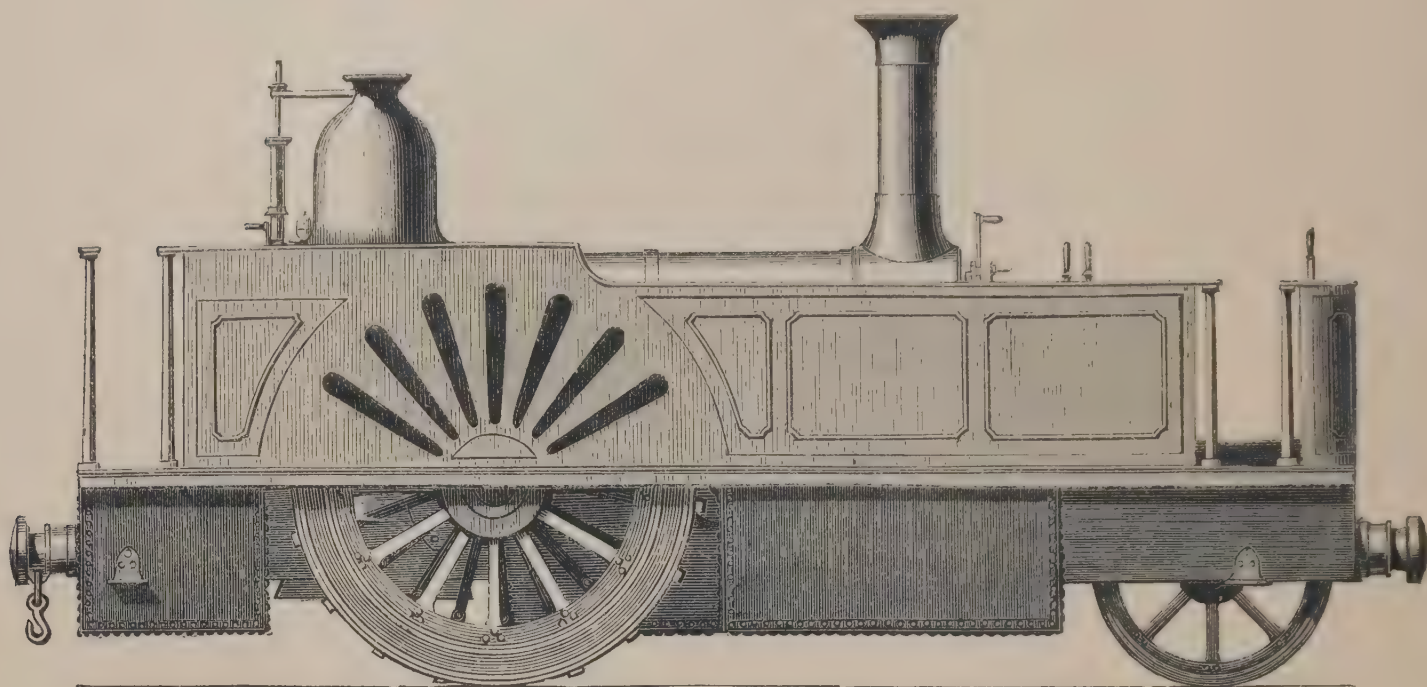
Mangle, the original Baker or box, improved.	Price	£10 10 0
Ironing mangle, with heated cylinder . .		8 10 0
Drying machine, centrifugal		10 0 0
Ironing stove, with stand plate		2 10 0
Drying stove—Model.		
Steam laundry—Plan of interior.		
Churn—"New," "The Vortex."—Drawings. Made from 2 to 50 gallons.		
The Guinea "Gem" Knife Cleaner.		

BRADFORD'S NEW PATENT E. E. WASHING MACHINE.

The E. E. (Eccentric "Eclipse") machines will commend themselves to the favour of those who will take the trouble to examine them.

The "Boudoir" E. E.	£1	10 0
The "Boudoir" E. E., combined	4	4 0
The "Nursery" E. E.	2	10 0
The "Nursery" E. E., combined	5	5 0
The "Cottager" E. E.	3	10 0
The "Cottager" E. E., combined	6	6 0
The "Family" E. E.	5	10 0
The "Family" E. E., combined	10	10 0
The "Contractor" E. E.	8	10 0
The "Contractor" E. E., combined . . .	15	15 0
The "Contractor" E. E., combined, with Patent Reverse Gear	20	0 0

BRAY'S TRACTION ENGINE COMPANY (Limited), 12 *Pall Mall East, London.*—A traction engine for common roads.



BRAY'S TRACTION ENGINE.

This engine was built at the Company's factory, to the order of Her Majesty's Government, and is intended for permanent service in Woolwich Dockyard. Its construction embraces many improvements, and the introduction of several appliances of great importance, but the feathering principle of the wheels, which is the great distinctive feature of this Company's patent, is preserved intact. This principle consists in the circumference of the wheel having small apertures through which, by means of an eccentric, "blades" or teeth can be protruded or withdrawn as required, according to the nature of the ground over which the engine is travelling. In many cases the ordinary surface of the wheel is sufficient to gain the requisite amount of tractive power; the blades can then be thrown out at the top, or on that part of the wheel not coming in contact with the road; while, in the event of the ground being soft or slippery, or of the engine having to ascend a steep incline, the auxiliary power of the blades can be brought into action, and the additional bite or grip on the road obtained, as may be necessary to gain progress. This system does no damage whatever to, but, on the contrary, tends rather to improve the roads, as the breadth of wheel of the engine has much the same effect on their surface as a roller.

Power is transmitted to the driving wheels by means of pinions on the crank shaft, working in large rack wheels, which are fixed to the arms of each driving wheel near the peripheries. The engine having different gearing the speed or power may be altered as desirable. The engine exhibited is fitted with a drum which renders it available for driving any fixed or portable machinery of whatever nature; a derrick or steam crane, with which it can load its own waggons, &c.; and a capstan or cone

barrel, whereby a rope, such as the fall rope of a tackle, may be hauled upon to any extent; so that, in addition to its tractive powers, it is applicable to all the purposes of a stationary or portable engine, which renders it particularly suitable for the service destined in Woolwich Dockyard.

The other special features of construction to be noticed in this engine are, the introduction of an improved steering gear, and of outside bearings for the driving wheels, which are mounted on springs on the inner and outer framings. By means of the first the engine is reduced to a state of the most perfect control, and can be guided with the greatest facility; and nearly all the jar, which involves extra wear and tear to the machinery, is obviated by the latter.

One of the Company's engines was employed in removing locomotive engines, the various castings, &c. for the large marine engines, and other heavy machinery, from different railway stations, manufactories, and the docks, into the Exhibition. The loads conveyed were sometimes as much as 45 tons, and reference can be made to the London and North Western Railway Company, Messrs. John Penn & Son, Messrs. Maudslays, Messrs. Humphreys & Tennant, and other eminent engineering firms, who employed the engine, as to its power and capabilities.

The above engraving represents an engine of still further improved construction, being built to the designs of the Company's engineer, Mr. D. K. Clark, C.E.

Further particulars respecting the engines, &c. may be obtained on application to Mr. S. H. Louttit, secretary to the Company, at the above address.

BRIDLE, HENRY, *Bridport, Dorset.*—Patent double-action refrigerator, for brewing and distilling purposes.

The cooling powers of this refrigerator surpass those of any hitherto in use: making unnecessary the employment of auxiliary coolers, and reducing boiling wort to nearly the same temperature as the water used for the purpose of reduction. By means of it the hottest weather ceases to be an obstacle to the production of a perfectly sound and brilliant article.

In introducing to the notice of brewers and distillers his double-acting refrigerator, the inventor feels justified in saying that he has succeeded in perfecting an apparatus which has long been sought after, calculated as it is to meet all the requirements of the trade.

The importance of securing a method by which wort can be cooled with rapidity in the hottest weather, need not be dwelt upon. A number of plans have been before proposed, but they have been accompanied by objections which have more or less interfered with their uniform success in working.

The improvements, however, which mark the invention now exhibited, are considered by practical brewers, who have inspected the apparatus, to obviate every difficulty which may have characterised those hitherto in use.

The advantages which attend its employment, may be briefly enumerated as consisting in the extraordinary cooling power which is rapidly attained, combined with the greatest cleanliness, strength, and simplicity, and united with the utmost economy of space and water, as well as cost.

Its mode of construction will be seen to guarantee its power. A series of flat pipes are arranged vertically in a case about 1 in. apart, through which the water passes in two streams, one over the other, in opposite directions, continuing through the whole length of the refrigerator, whereby a uniform temperature of the water in each pipe is preserved throughout its entire length and depth.

From the water traversing the pipes in the manner indicated, in such thin columns, and every particle of wort of necessity running round every pipe, and being by an obvious arrangement kept flowing in a continuous stream over the whole cooling surface of the refrigerator, it not only receives the cooling power of all the water employed, but the cooling influence of the atmosphere also.

If it should be objected by any who are accustomed to the various forms of refrigerators adopted, that the wort should not be exposed to the influence of the atmosphere, it may be stated that this apparatus admits of either method of working, allowing, if desired, the wort to traverse the inside of the pipes, subject to the external cooling influence of the water.

Absolute cleanliness is one of the great features in this refrigerator, as the pipes being perfectly flat and smooth, and standing edgeways, present but a slight surface for the deposit of sediment, especially as the wort is con-

tinually flowing around them in a rapid stream. What little may accumulate, can be cleaned off by passing a brush between the pipes; and as the bottom forms a hollow underneath every alternate pipe, it serves to empty the refrigerator (of wort when in use, or water when cleaning it) through openings in the side of the refrigerator into the draining pipe. As the whole of the wort and water is contained in the refrigerator, no wood cooler is required, which materially adds to its cleanliness: tinned copper, of which it is constructed, being easier to clean than wood-work. The cleansing of the inside of the pipes, may be still more easily effected, by fitting a movable cap to the end of every pipe, as in the one exhibited. This plan will, however, add to the cost of the refrigerator.

Its strength is such, from the pipes, although flat, being made in a series of small compartments, that they are able to bear almost any pressure of water that may be driven through them; and the sides of the refrigerator and the ends of the pipes being of brass, cast together and tinned, they cannot well be damaged.

Its simplicity is such that any workman, having a knowledge of a brewery, can use it; as all the inlets and outlets are connected by union joints, and the supply of wort and water regulated by stop cocks.

The various advantages which have been shown to belong to this refrigerator cannot fail to be appreciated, as valuable acquisitions to the manipulation in the art of brewing, especially when taking into consideration the economy of cost, which a reference to the price list will show.

The readiness with which this apparatus can be adapted to existing arrangements in any establishment is also a great recommendation. Indeed, the portability of those of a moderate size is such that they may be moved from one place to another with the utmost convenience, if necessary, only requiring a few inches' fall, dependent on the distance from the hop back.

The water, after its employment for cooling, may be made available for all purposes for which it may be needed. Its heat upon leaving the refrigerator is about 140°.

The results attending the use of this admirable apparatus have been most astonishing. The numerous firms adopting it, have found it so much to exceed their expectations, that they have spontaneously forwarded to the inventor their testimonials in its favour. These may be seen on application, together with price lists, and full particulars of its extraordinary cooling powers.

This refrigerator can be constructed without the copper bottom: in this case it is laid in a wood cooler, the passage of the wort, round the pipes, remaining the same. By adopting this plan, its power is slightly lessened, and for the purpose of cleansing, the apparatus must be lifted. Whichever arrangement is selected, the price will be the same.

LIST OF PRICES, &c.

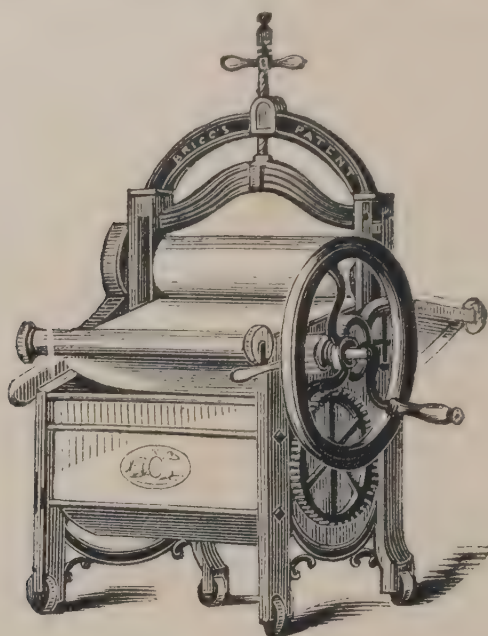
The following is the guaranteed scale of sizes, together with the power of each for reducing the wort to 58° with water at 52°, accompanied by the cost, including royalty.

	Length.	Width.	Depth of Pipes.	Cooling Power per Hour.	Price.
No. 1	4 ft. . . .	2 ft. . . .	7½ in. . . .	6 barrels	£ 50 0
No. 2	5 ft. . . .	2 ft. 3 in. . . .	7½ in. . . .	8 barrels	63 0
No. 3	6 ft. . . .	3 ft. . . .	7½ in. . . .	12 barrels	86 0
No. 4	7 ft. . . .	3 ft. . . .	7½ in. . . .	14 barrels	95 0
No. 5	7 ft. . . .	4 ft. . . .	7½ in. . . .	18 barrels	120 0
No. 6	7 ft. . . .	4 ft. 4 in. . . .	7½ in. . . .	20 barrels	135 0
No. 7	8 ft. . . .	4 ft. 4 in. . . .	7½ in. . . .	22 barrels	155 0
No. 8	9 ft. . . .	4 ft. 4 in. . . .	7½ in. . . .	26 barrels	180 0
No. 9	10 ft. . . .	4 ft. 4 in. . . .	7½ in. . . .	28 barrels	195 0
No. 10	8 ft. . . .	4 ft. 4 in. . . .	11 in. . . .	32 barrels	220 0
No. 11	9 ft. . . .	4 ft. 4 in. . . .	11 in. . . .	36 barrels	250 0
No. 12	10 ft. . . .	4 ft. 4 in. . . .	11 in. . . .	40 barrels	275 0

The cost of those of larger dimensions can be obtained on application.

BRIGGS & STARKEY, *Leeds and Liverpool*.—Washing, wringing, and mangling machines.

Have obtained 47 first-class Prize Medals.



WASHING MACHINE.

THE patentees have had their machines tested in nearly all parts of the world, and have received the largest number of first-class prize medals and others, for improvements in their patent washing, wringing, and mangling machines, thus showing their superiority over all others at present in the market. A list of 10,000 references can be had, to persons who have their

machines in regular use, on application to the manufactory. Intending purchasers can have machines sent to any part of the kingdom upon application, accompanied with a good reference, to the above address. Specimens may be seen and prices obtained in the Exhibition Buildings.

Prices varying from £1 16s. to £9.

[1811]

CAMERON, PAUL, *Glasgow*.—Steam pressure and vacuum gauges, improved self-acting lubricator.

[1812]

CARR, THOMAS, *New Ferry, near Birkenhead*.—Patent disintegrator mills ; patent fan blower.

CARR'S PATENT DISINTEGRATOR MILL, for disintegrating and mixing conglomerated phosphates, guano, chemicals, &c. Also for pulverising bone ash, boiled bone, chemical crystals, coal, and other unfibrous or brittle materials. Also for mixing purposes, such as converting brown sugars of various shades into one uniform sample.

Price,

Without external wood casing £60
With external casing complete 64

This machine, which requires about 6 horse-power to drive it, is warranted thoroughly to break up, pulverise, and perfectly mix from 30 to 40 tons per day, of either hard and dry, or soft and damp conglomerated phosphate, guano, &c. without any inconvenience from becoming clogged or choked in the operation.

When applied to pulverise bone ash, or boiled bone, no mill driven by the same power can at all approach it in rapidity, as from 60 to 70 tons a day of these materials have been reduced by it to a powder, varying from dust up to the size of rice. For mixing purposes alone the machine has also given great satisfaction at sugar works, and other manufactories.

A small machine, capable of being worked by hand as well as by steam power, chiefly for mixing purposes, is also manufactured. Price, with iron casing, complete, £21.

Further information may be obtained either from the patentee, Thomas Carr, New Ferry, near Birkenhead, or from the manufacturers, Messrs. Richmond & Chandler, Salford, Manchester, either of whom will forward, on application, an illustrated circular, fully explaining the details and principles of the machine.

[1813]

CARRETT, MARSHALL, & Co., *Sun Foundry, Leeds*.—Compound direct-action condensing engine, double-action steam pump and fire engine, &c. (*See page 11.*)

CARRETT, MARSHALL, & Co., *Sun Foundry, Leeds.*—Compound direct-action condensing engine; double-action steam pump and fire engine; 3-horse engine.

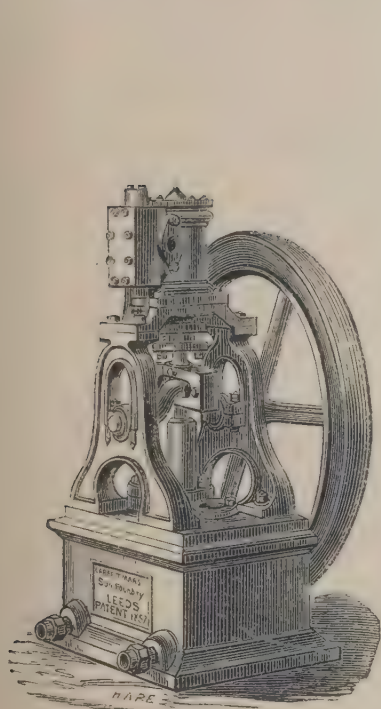


FIG. 1.

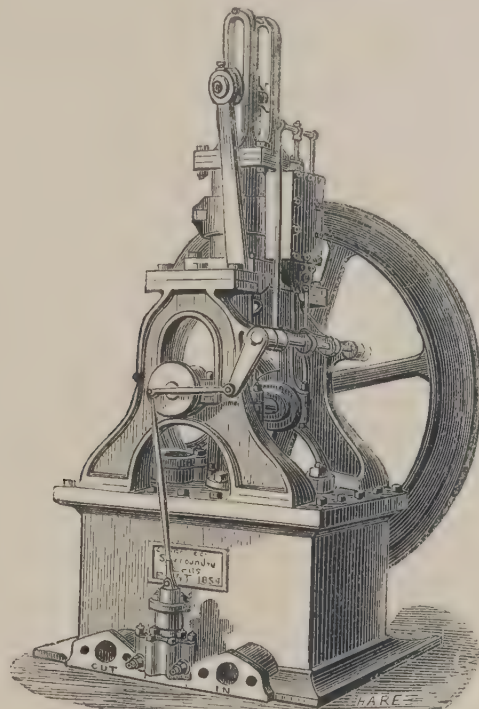


FIG. 3.

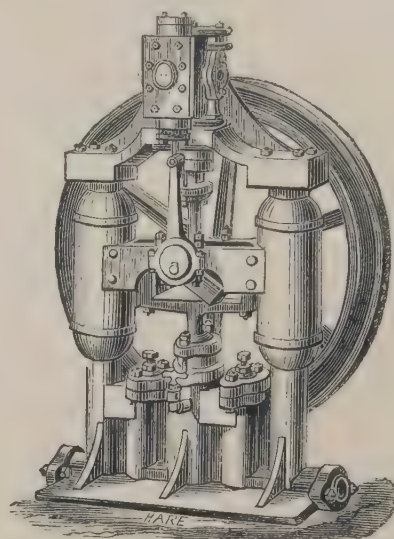


FIG. 2.

PATENT STEAM PUMPS to raise in one continuous stream from 3,500 to 100,000 gallons, from 50 to 100 feet, in 10 hours or upwards.

Fig. 1. Constructed for feeding stationary boilers, for 7,000 gallons in 10 hours, and sizes upwards.

Fig. 2. Constructed for feeding marine and locomotive boilers, for 7,000 gallons in 10 hours, and sizes upwards.

Fig. 3. For the above purposes, and also as a water lift, to raise up to 100,000 gallons in 10 hours. Fig. 3, as exhibited, is made double-action as a stationary fire engine, delivering in a perfectly continuous stream 10,000 gallons 125 ft. high per hour. All these modifications have inlet and outlet air-vessels.

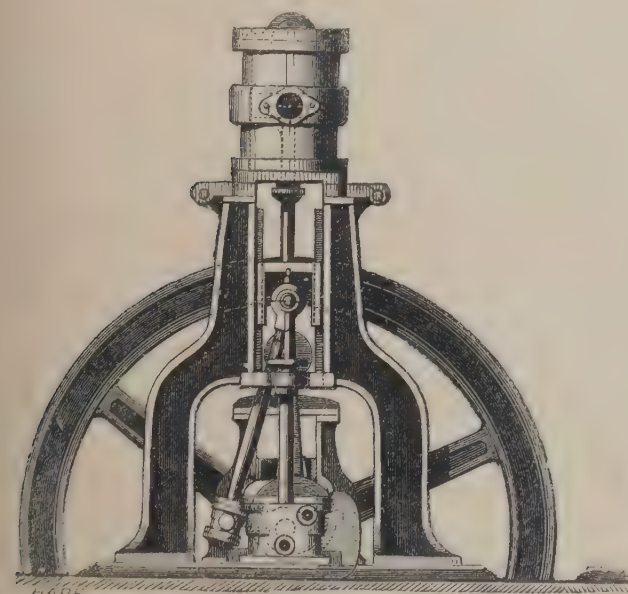


FIG. 7.

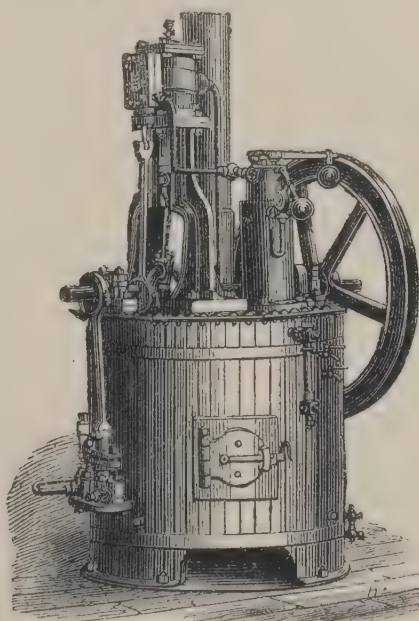


FIG. 6.

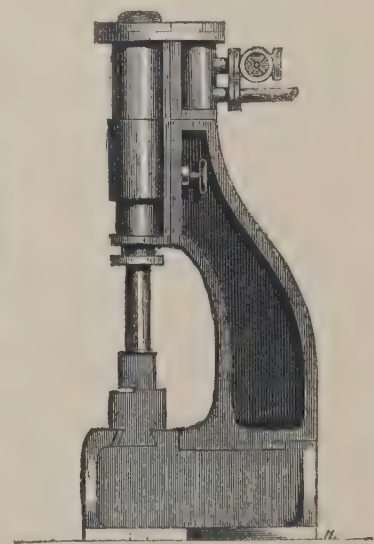


FIG. 8.

Fig. 6. A THREE-HORSE POWER PORTABLE ENGINE, upon an improved vertical-flued boiler of 4 horse-power, constructed of boiler plate welded and riveted, the interior being everywhere accessible by a man-hole for cleaning out. The boiler serves the purpose of foundation entirely.

Fig. 7. The same class of DIRECT-ACTION VERTICAL ENGINE, constructed from 1 to 25 horse-power. All the parts are direct-action and self-contained on one plate, and expansive motion for variable cut-off of steam is advantageously applied herein.

A PATENT HYDRAULIC RECIPROCATING ENGINE used as a motor, from 1 to 60 strokes per minute, for working bellows of organs, stone-sawing, and other reciprocating purposes. Two examples exhibited.

A NOMINAL 12-HORSE POWER HORIZONTAL COMPOUND ENGINE contained on one bed-plate and foundation, with one slide for varied degrees of expansion, working both

the high and low pressure cylinder, with the least possible distance for the port steam to traverse, with the freest openings into and out of cylinders, and with the working parts of one engine balancing the other. Condenser and air pump are double-acting in direct action. This engine has no dead centre, and will work at a maximum speed.

Fig. 8. PATENT SELF-ACTING 2-CWT. STEAM HAMMER, without levers, valve motion, or stuffing box; and for a variable stroke and intensity of blow.

A model of PATENT WATER CRANE worked by the pressure of Town's water or hydraulic pressure. This pillar crane will swing all round, and is of 3 powers, consuming water in proportion to weight raised only. These cranes are also made of 6 powers. For 3 powers the water is admitted on 1 and 2 and $2 + 1 = 3$ area, and for 6 powers the areas are in the ratio of 1, 2, 3, from which any proportion up to 6 can be obtained.

[1814]

CATER, HENRY, 9 *Anchor Terrace, Southwark Bridge*.—Patent multitubular steam boiler.

[1815]

CHADBURN, BROTHERS, *Nursery, Sheffield*.—Patent metallic steam or water pressure gauges, tallow feeders, &c.

[1816]

CHALMERS, DAVID, 43 *Holmhead Street, Glasgow*.—Hot air engine.

[1817] •

CHANDLER, JAMES, 10 *Mark Lane, London, E.C.*—Patent flat glass water gauges for steam boilers and other vessels. (*See page 13.*)

[1818]

CHANTRELL, GEORGE FREDERIC, 6 *Hatton Garden, Liverpool*.—Model of Chantrell's patent animal charcoal revivifying furnace for sugar refineries.

The 12-chamber size of this furnace is calculated to return from 60 to 70 tons per week,

The sizes of furnaces vary from 4 chambers to 48, or 12 rows of 4 chambers each.

These furnaces are in operation in all the leading refineries in the kingdom, and are cheap, durable, and efficient; effecting a saving in fuel of upwards of 50 per cent.

[1819]

CHAPLIN, A., *Glasgow*.—Carrying and traction engine for common roads; steam crane used by the Commissioners; ship's crane. (*See page 14.*)

[1820]

CHEDGEY, JOHN, *Grove, Southwark*.—Mangle, with glass bed and rollers, glass pump, and glass pipes.

[1821]

CHESHIRE SALT COMPANY (Limited), *Winsford, Cheshire*.—An improved steam apparatus for the manufacture of salt.

This Company are manufacturers of table, butter, common, and fishery salt, by a patent steam process, and proprietors of MESSRS. JUMP & HALL'S PATENT FIRE-FEEDERS.

MACHINERY IN OPERATION:—

JUMP & HALL'S PATENT STEAM-PAN, for the manufacture of fine or table salt.

STEAM-PANS ATTACHED TO THE BOILING PAN, for the purpose of making common or fishery salt.

JUMP AND HALL'S PATENT FIRE-FEEDER.

Samples of salt manufactured by the Cheshire Patent Salt Company (Limited).

These steam-pans and fire-feeders have been in successful operation for two years, and from the great economy in labour, wear and tear, fuel and heat, combined with their great simplicity of arrangement, they have proved themselves most valuable inventions.

The fire-feeders can be attached to any boiler, and can be seen daily at work at the Company's Works, at Winsford, Cheshire, where the whole of the salt pans are erected on the patent steam principle.

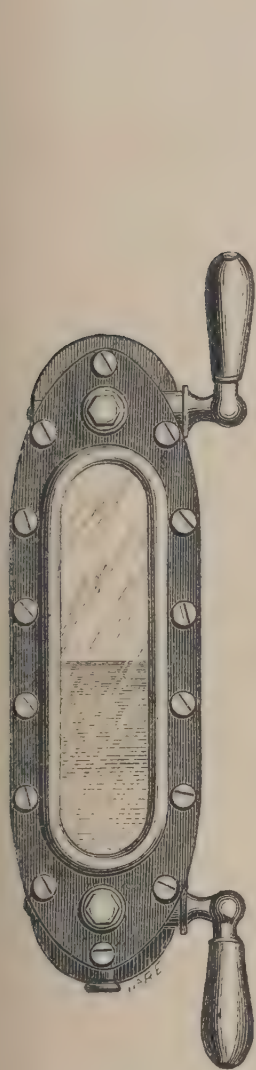
[1822]

CLARK, D. K., 11 *Adam Street, Adelphi, London, W.C.*—Smoke-consumer, and feed-water heater.

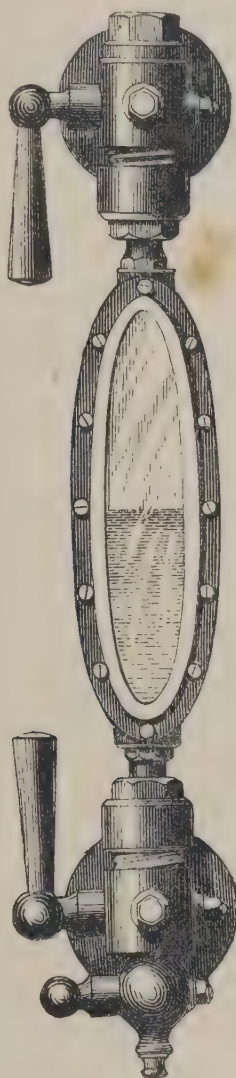
[1823]

CLARK, JOSEPH LESTER, 2 *Sambrook Court, Basinghall Street, E.C.*—Patent fire bars for consuming smoke and economizing fuel.

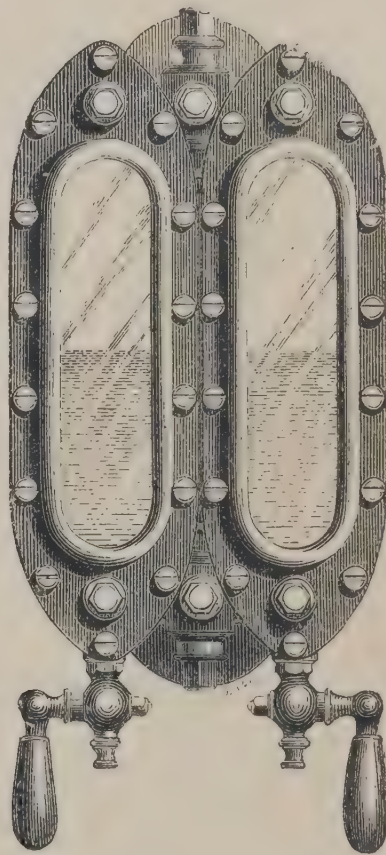
CHANDLER, JAMES, 10 *Mark Lane, London, E.C.*—Patent flat glass water gauges for steam boilers and other vessels.



SINGLE GAUGE A.



UNIVERSAL GAUGE B.



DOUBLE AND CHECK GAUGE C.

The chief advantages of these gauges are—strength, simplicity, durability, steadiness of water level, and perfection of sight.

GAUGE A. This gauge is intended more especially for new boilers.

GAUGE B. This gauge is intended to replace the common glass tube on existing boilers, or to be used in conjunction with the ordinary glass tube connexions for new boilers. These cases are made various lengths to suit various boilers, and can be attached, by simply removing the glass tube, and into the same stuffing boxes inserting the tubes attached at each end of the gauge. Then place the patent case between them, and finally screw the two tubes into it. Persons desirous of using this gauge with existing boilers, should send the following dimensions:—1st. Length of tube they are using. 2d. Diameter of ditto. 3d. Distance between the glands.

GAUGE C. The object of this gauge is, that the several indications should check each other; and should any accident occur to either of them, it can be shut off during repair, at the same time the opposite one can be used singly or as duplicate, or both can be shut off at the same time.

The exhibitor has always a large stock on hand.

The following are selected from a great number of testimonials to the value of these gauges:—

*“Metropolitan Board of Works,
Engineers’ Department, Spring Gardens,
March 20, 1862.”*

“Two of Mr. Chandler’s patent flat glass water gauges have been fixed on two high-pressure engine boilers belonging to the Metropolitan Board of Works at St. George’s Wharf, Deptford, for nearly two years. They have been exposed all the winter, and have withstood great pressure without leaking, cracking, or any defect whatever. The water-line can be readily seen by day and night, and they are well adapted for such boilers.

“J. W. BAZALGETTE, Engineer.”

*“Engine and Agricultural
Implement Manufactory, Lynn,
Feb. 28, 1861.”*

“DEAR SIR,—I beg to say that the gauge I had of you answers the purpose very well. The size of the glass shows such a large column of water that the driver can see it some yards off. I have just had another, as you are aware, which I am now fixing on a new engine, and hope by harvest to want several others. I shall certainly continue to use them, as I think them far preferable to any other that I have seen, and would urge other makers to give them a trial; and if they do, I feel sure they would be equally pleased with them. Wishing you a large demand,

“I am, sir, your truly,

“JAMES CHANDLER.”

“R. S. BAKER, *Engineer.*”

“Deptford, March 2, 1861.”

“DEAR SIR,—In answer to yours of the 25th ult., asking for a testimonial, I beg to say that the two gauges you put on the boilers here are the most perfect I have ever seen, they having withstood great pressure and much exposure. I have every confidence in them, and deem them worthy of the highest recommendation, and shall at all times be happy to speak in their favor.

“I remain, yours truly,

“R. A. RUMBLE, *Engineer.*”

“MR. J. CHANDLER.”

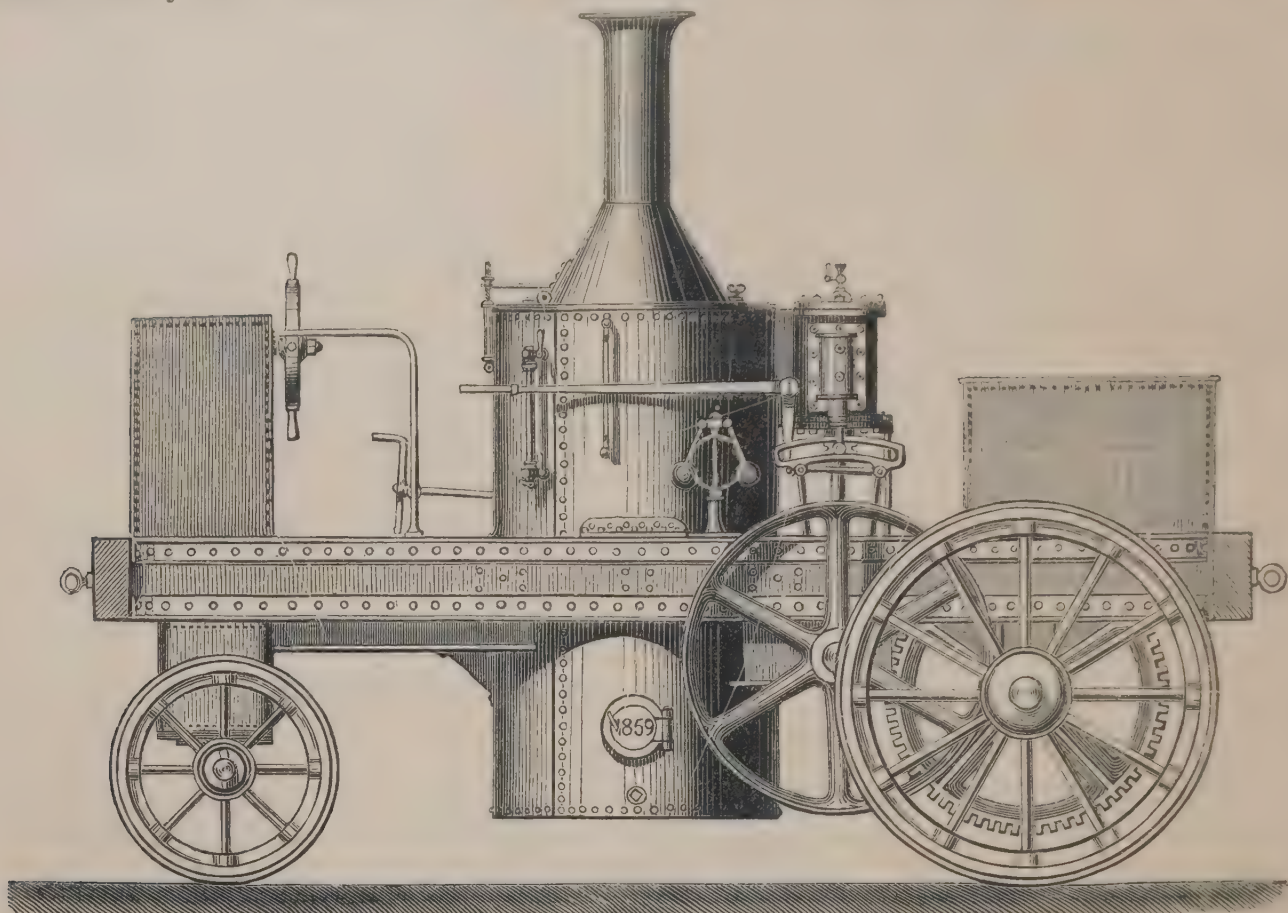
*“Lambeth Waterworks, Kingston,
July 8, 1861.”*

“MR. CHANDLER.

“SIR,—In reply to your inquiry respecting your patent flat glass water gauges in use on two of these boilers here, I am happy to say they have given great satisfaction, and I am very pleased with them, as they have not been the least trouble since they started, which is nearly two years ago. I am sure any one who tries them will be highly pleased, especially those made according to your second patent.

“H. CARRUTHERS.”

CHAPLIN, ALEXANDER, *Glasgow*.—Carrying and traction engine for common roads; steam crane used by the Commissioners; ship's crane.



CHAPLIN'S PATENT PORTABLE STEAM ENGINES AND BOILERS.

From the strength, simplicity, and compactness of these engines, they are extensively used for general purposes, and also in situations where steam engines of the ordinary construction cannot be applied.

STATIONARY ENGINES (Fig. 1) require no building in, nor chimney stalk, and with the forced-combustion apparatus will burn inferior qualities of coal, wood, or peats. These engines are specially suited for shipment, and may be packed inside the boiler to economise freight.

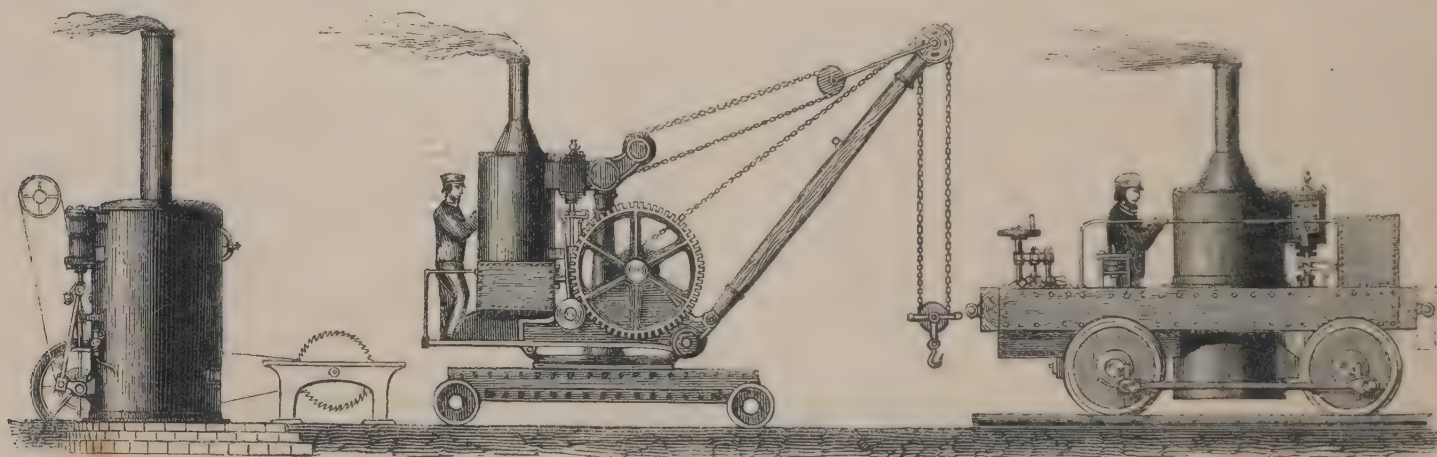


Fig 1. STATIONARY ENGINE.
From 1 to 30 Horse-power.

Fig. 2. PORTABLE STEAM CRANE.
30 Cwt. to 10 Tons.

Fig. 3. CONTRACTORS' LOCOMOTIVE.
6 to 27 Horse-power.

PORTABLE STEAM CRANES (Fig. 2) for wharf or railway, with wrought-iron carriages on wheels, sink motion, foot break, &c. all under the easy control of one man; the 4 and 5 horse power hoist and lower by steam, and twist by hand; the larger sizes hoist, lower, and turn round by steam.

CONTRACTORS' LOCOMOTIVES (Fig. 3) are adapted to work on rails or tramways of a gauge from 2 ft. upwards. They are complete and efficient locomotives, simple in construction, and the working parts easily got at for repair. They draw heavy loads at reduced speeds; for shipment these engines are usually sent in one package, ready for work on arrival.

ROADWAY OR TRACTION ENGINES (as illustrated above), are adapted for travelling over hilly or soft ground, for simply propelling themselves, or for taking behind them heavy loads at a speed, proportionate to the load, of from 2 to 10 miles an hour. Each engine is complete with coal and water tanks, &c. and under the control of one man.

CARRYING ENGINES adapted to carry loads up to 50 tons.

HOISTING ENGINES, on carriages of wood or iron, and iron wheels, with crab winch, &c. complete. The engine, break, &c. are under the easy control of one man.

HOISTING ENGINES, similar to above, but with pillar and jib, to swing about three-quarters round by hand.

LIGHT PORTABLE ENGINES, specially adapted for agricultural purposes, and for sawing, pumping, &c.: while, from their lightness and simplicity of construction, the 4 and 6 horse power are an easy load for one horse. The larger sizes are mounted on 4 broad roadway wheels, the front pair being made to swivel.

SHIP ENGINES specially suited for winding, cooking, distilling, &c. on board ships of every class; and for aiding the crew in performing the heavy work of the ship, such as heaving anchors, discharging cargo, hoisting heavy sails, &c. One fire serves both for the steam boiler and cooking and distilling apparatus, with a small consumption of fuel.

Prices and other particulars may be learned by applying at the Cranstonhill Hill Engine Works, Glasgow, or at the London depôt, Lambeth Wharf.

[1824]

CLAYTON, SHUTTLEWORTH, & Co., *Lincoln, and 78 Lombard Street, London.*—High pressure fixed and portable steam engines.

A 12-HORSE POWER HORIZONTAL FIXED STEAM ENGINE, manufactured by the exhibitors, with cylinder 11 in. in diameter, 16-in. stroke, governors, and all usual appendages, fitted on planed-up iron bed plate, complete.

Price, including Cornish boiler, 14 ft. long by 5 ft. diameter, made of Lowmoor and best Butterley plates £280 0

[1825]

CLOWES, FREDERIC J., 92 *Southwark Bridge Road, London.*—Patent metallic spring steam and vacuum gauges, and steam boiler fittings.

[1826]

COFFEY, JOHN A., *Finsbury.*—Pharmaceutical and other apparatus, stills, &c.

[1827]

COLQUHOUN & THOMSON, 1 *Laurence Pountney Hill, Cannon Street.*—Movable girder fire bars.

[1828]

COOMBE & Co., 30 *Mark Lane; Manufactory, Gower's Walk, London.*—French mill stones, flour machines, wire brushes, patent smut machines, general flour mill machinery.

(Obtained medals at the Great Exhibition of 1851, for woven wire, &c.)

COOMBE & Co. subjoin a list of the manufactures in which they are engaged.

General wire weavers, workers, and brush makers; builders of French millstones, and importers of French burrs; dealers in peak, Cologne, and grindstones.

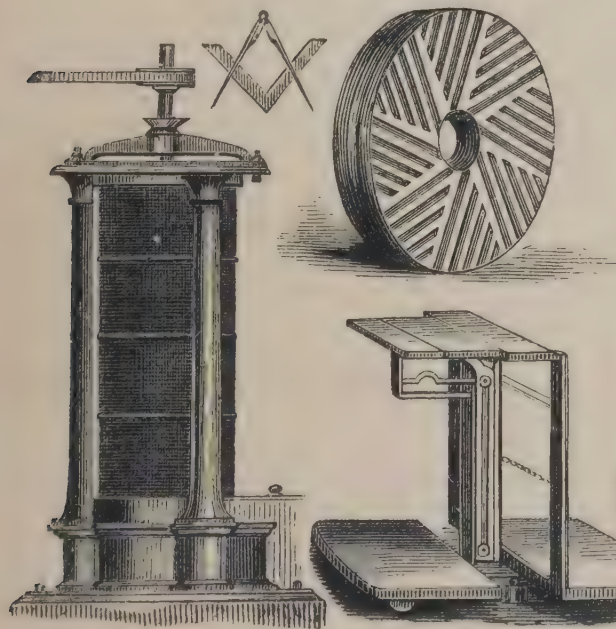
Manufacturers of patent iron revolving flour-dressing machines, and Ashby's patent corn or smut machines.

Improved steel machine wire; brushes of all kinds for machinery; weighing machines, scales, beams, steel

mills, &c.; wood cylinders; iron millstone provers; mill chisels and picks; patent punched iron; hoisting chain; extra strong wire malt-kiln heads, and malt screens; separators for wheat, barley, oats; trucks, shovels, corn measures, sieves, brooms, &c.; leather straps, elevator webbing, tin buckets and rivets, gut, gutta-percha bands; waterproof cart covers, sacks, &c.; iron pulley blocks, screw jacks, &c.; improved patent bolting cloths.

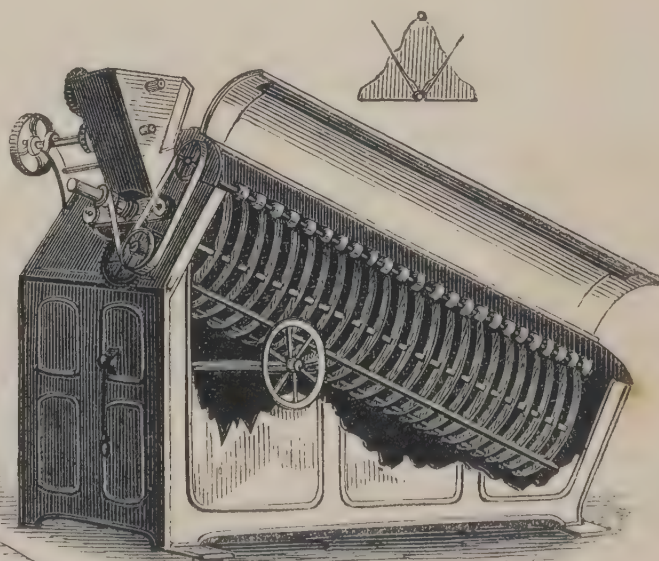
They are also importers of Swiss and French silks.

FRENCH MILL STONE.



ASHBY'S PATENT
SMUT MACHINE.

WEIGHING
MACHINE.



IMPROVED
PATENT IRON FLOUR CYLINDER.

[1829]

CORCORAN, BRYAN, & Co., *Mark Lane.*—Specimens of metallic cloth; model of malt kiln; silk flour-dressing machine, mill stones, &c. (See page 16.)

[1830]

COWAN, THOMAS WILLIAM, *Kent Iron Works, Greenwich.*—Patent nominal 6-horse power trunk engine. (See page 17.)

CORCORAN, BRYAN, & Co., *Mark Lane*.—Specimens of metal cloth; model of malt kiln; silk flour-dressing machine, mill stones, &c.

BRYAN CORCORAN, & Co. are the original makers of paper-machine wires, which they now weave to the width of 9 ft. They manufacture every sort of wire work, deckle straps, felts, dandy rolls, moulds, and every description of driving bands. Established 1805.

THE CASE OF SPECIMENS CONTAINS :—

Samples of wire-drawing in the various stages, from the bar of metal to the finest thread of wire.

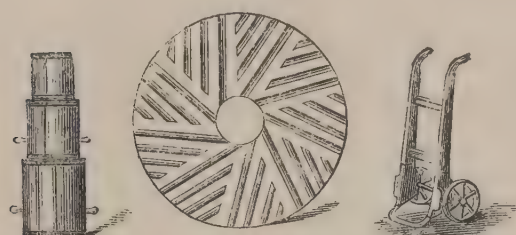
3,000 yards of copper wire, (or nearly $1\frac{3}{4}$ miles) drawn out of an old penny-piece.

1,300 yards of brass wire, (nearly $\frac{3}{4}$ of a mile) weighing only 1 ounce.

1,000 yards of iron wire, (nearly $\frac{1}{2}$ a mile) weighing only 1 ounce.

Samples of woven wire, from 1 to 28,800 holes in a square inch.

Fine and strong samples of various sorts; samples of Swiss silk, &c.



The largest millstone is 5 ft. 8 inches diameter in one solid block: a very rare specimen.

Millstones of various sizes, of the finest quality ever produced, for grinding wheat.

Peak, granite, and Cologne stones, grindstones, plaster, &c. mill bills and chisels of finest cast-steel.

Mahogany stone staffs and iron provers, iron blocks with brass sheaves.

Wire for flour and smut machines.

Silk dressing machines, elevators, and worms.

Separators for peas, wheat, &c.

Brushes of all sorts for machinery.

Corn measures of all description.

Sack chains, jiggers, punches, spanners, &c.

Swiss dressing-silk.

Blackmore's bolting cloths.

The exhibitors are also erectors of malt kilns on improved principles, as shown in model; makers of woven-wire kiln plates of any dimensions; malt and



MALT KILN.

corn screens; malt gauges; shovels; sieves, bushels, sack trucks, and chondrometers for ascertaining the weight of corn from sample.

[1831]

CROSS, T. W., & Co., *Leeds*.—Fire engines.

[1832]

CUNLIFFE, THOMAS, & SONS, *Ardwick, Manchester*.—Leather belts, skips, &c.

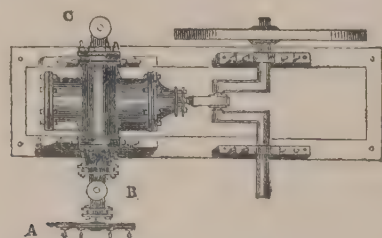
[1833]

DAVIES, JONAH & GEORGE, *Albion and Limerick Foundry, Tipton*.—Patent improved rotary engine and pump, applicable to all purposes.

[1834]

DAVIS, J., *Ulverston*.—Steam engine, with fixed valve adapted.

These valves are applied to oscillating engines to dispense with the use of all eccentrics and other gearing for



working the steam valve, or "reversing." From the

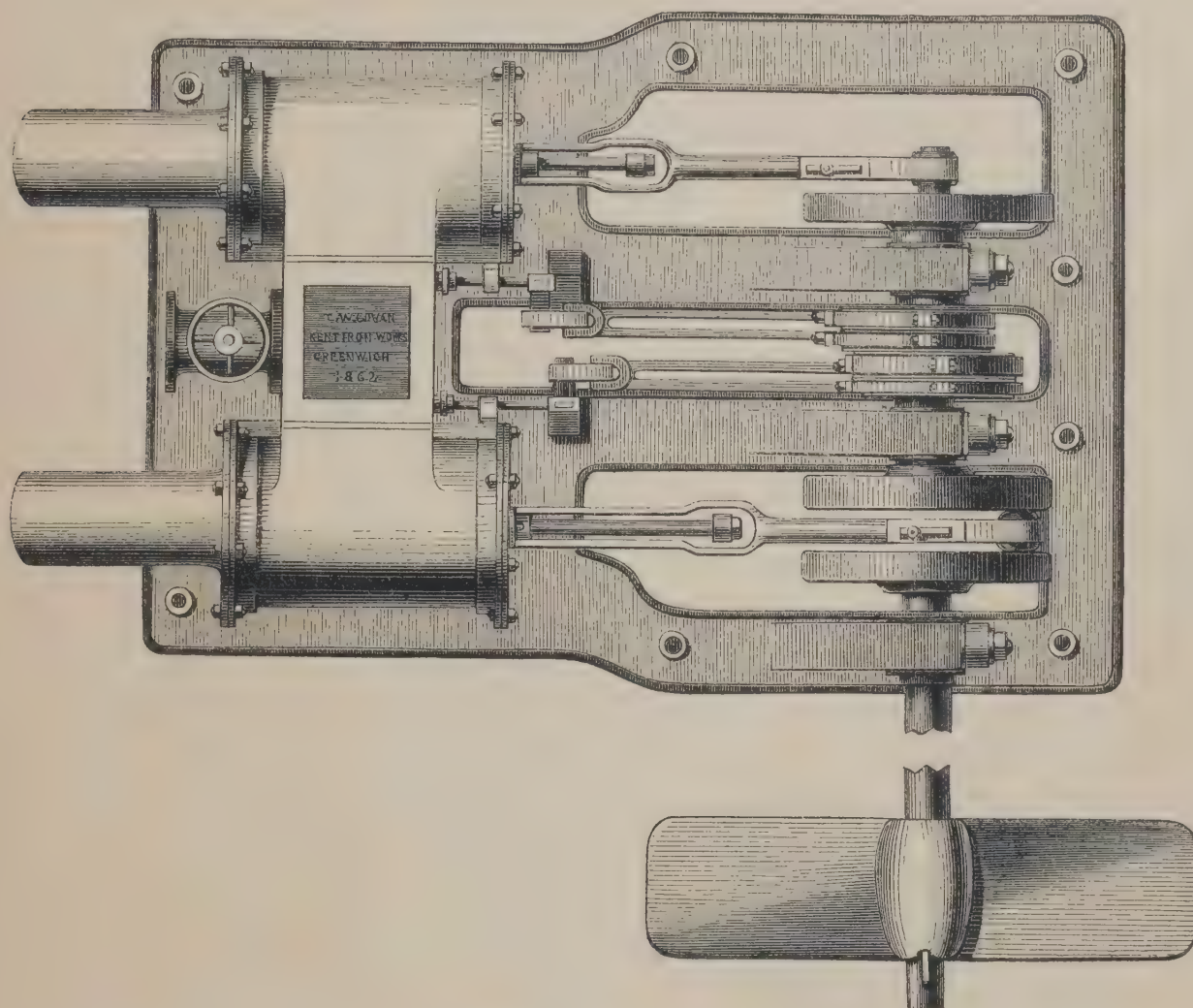
simplicity of arrangement, they are not liable to get out of order: the wear keeps the valve faces true.

The engine (plan of which is given) is adapted for marine, locomotive, and general purposes. The motion of the engine is reversed by simply moving the index or lever A, to the side or direction in which it is desired to move. B steam pipe, C exhaust pipe.

The model shows another arrangement of valve to effect the same purpose.

Price of engines, complete, from £7 to £10 per horse power, according to size. (Exhibited in Class VII B.)

COWAN, THOMAS WILLIAM, *Kent Iron Works, Greenwich.*—Patent nominal 6-horse power trunk engine.



PATENT TRUNK ENGINE.

BURGH & COWAN'S PATENT TRUNK ENGINE of 16-horse power.

It is a well-known fact that the trunk engine is the most simple at present in use ; but the immense friction of the trunks in their respective stuffing boxes, and their alternate exposure to the steam and atmosphere, render them highly destructive to steam and tallow.

T. W. Cowan, the sole manufacturer of Burgh & Cowan's patent engines, is desirous of introducing them to the public. The following are a few of the many advantages gained by the use of these improvements :—

1. The area is gained, hitherto lost in trunk engines, thereby a saving in space.

2. The immense stuffing boxes being entirely dispensed with, a great reduction in friction and packing is effected.

3. The trunks are never alternately exposed to the steam and atmosphere ; also the moving or piston trunk is entirely frictionless, gaining a considerable saving in tallow and in steam.

4. The connecting rod is in the centre of the cylinder, and perfectly accessible to tighten and lubricate, which dispenses with the guides beyond the cylinder.

5. The guides being within the cylinder, and cast in the trunk, they never get loose, and are entirely out of harm's way.

6. In beam engines, this improvement entirely dispenses with the expensive and complicated parallel

motion, thus rendering engines cheaper and simpler than those at present in use.

7. In high and low pressure engines, the high pressure is within the low pressure, while the areas of both are maintained. This is a great advantage over those at present in use.

8. The simplicity of the whole engine, together with the small space it occupies at any given horse-power, renders it highly advantageous, particularly for marine purposes.

9. In stationary engines the connecting rods are about six times the length of crank.

10. Marine engines made on the same principle as the above engraving are much lighter, take up less space, and are much cheaper to work than any other description of engines.

11. Vertical engines on this principle are particularly adapted for places where there is little room to spare ; a 10-horse power engine only taking up the space of 1 foot 4 inches by 1 foot 8 inches.

12. In steam fire engines the pumps are connected by a rod, to the piston, through the bottom trunk, thereby taking up less space.

13. The high and low pressure engines are invaluable where fuel is expensive, as they save a great deal of steam that is altogether lost in other engines.

These engines being of the best materials and workmanship are found to be cheaper and work longer than any other engines.

[1835]

DAWSON, CHARLES S., *Thames Ditton, Surrey*.—Hydrostatic engine.

[1836]

DAWSON, JOHN, *Greenpark, Scotland*.—A machine for protecting the revenue derived from the manufacture of spirits.

[1837]

DEACON, HENRY, *Appleton, near Warrington*.—100 millions 4-wheeled counter; 3-wheeled electric clock, seconds, minutes, and hours.

[1838]

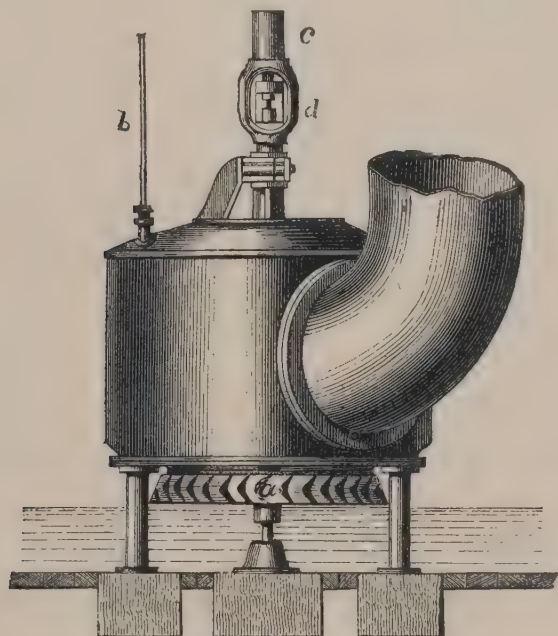
DINGWALL, WILLIAM, 4 *Idvies Street, Dundee*.—Patent water meter, with distributing valves placed in a movable diaphragm.

[1839]

DIXON, E., *Wolverhampton*.—Wrought-iron gas tubes and connexions.

[1840]

DONKIN, B., & Co., *near Grange Road, Bermondsey*.—Turbine water wheel, and gas valve. Drilling apparatus for mains.



TURBINE WATER WHEEL.

TURBINE WATER WHEEL, suitable for a high fall of water.

- a* Revolving ring with buckets in a single casting.
- b* Shaft communicating with regulating valve tackle.
- c* Vertical shaft, transmitting the power.
- d* Bearing brass for supporting weight of revolving wheel, which bearing, being out of the water is readily accessible.
- e* Pipe for bringing water to casing.

This wheel, with a 40 ft. fall of water, would give a

power of 36 horses, or 33,000 lbs. lifted 1 ft. high per minute, and would make 150 revolutions per minute.

For falls under 15 or 16 ft. the casing *f* is unnecessary; the turbine being placed in a brick or wooden pit.

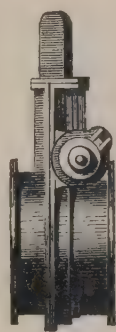
The advantages of the turbine are:—

A high speed, rendering the gearing comparatively simple and inexpensive.

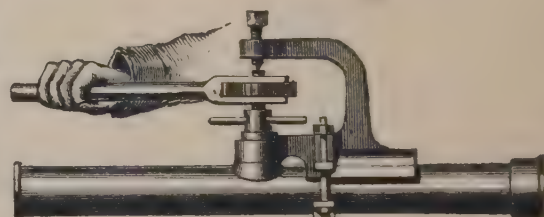
Freedom from the inconvenience arising from floods, as the wheel will work immersed many feet under water.

An economy with regard to the useful effect, as compared with an ordinary water wheel, on any given fall.

IMPROVED VALVE FOR GAS MAINS, so constructed that there are no external working parts; the one exhibited is for a main of 30 in. bore.



VALVE.



DRILLING APPARATUS.

UPWARD'S PATENT DRILLING APPARATUS.

This invention is calculated to prevent accidents, by furnishing the means of drilling holes in gas mains when laying service pipes, as the hole is both drilled and tapped, without allowing an escape of gas.

[1841]

DORWARD, WM. L., 15 *Camden Square, Camberwell*.—Rotary engines for ships' propellers, and other purposes.

[1842]

DUNCAN, THOMAS, 44 *West Derby Street, Liverpool*.—A water meter, from which power may be obtained for driving machinery.

[1843]

EADIE & SPENCER, *Glasgow*.—Iron tubes for boilers.

[1844]

EASTON, AMOS, & SONS, *Grove, Southwark*.—Patent centrifugal Appold pump, improved turbine, hydraulic ram, pumps, &c.

THE FOLLOWING MACHINERY IS EXHIBITED:—

An improved patent combined APPOLD'S CENTRIFUGAL PUMP AND STEAM ENGINE, for drainage of marsh lands or irrigation, and used also for graving dock, and other purposes. The machine exhibited is of 40-horse power nominal, and is driven by a pair of expansive condensing steam engines. It is capable of delivering 100 tons of water per minute at a mean lift of 6 ft. The principal advantages obtained by the arrangement are, compactness, economy, and the dispensing with the greater portion of the ordinary massive foundations; the machine being entirely self-contained.

Smaller patent APPOLD CENTRIFUGAL PUMPS, of improved construction, for general purposes. The construction is such, that the whole of the internal working parts, may be withdrawn, without disturbing the casing and framing.

Improved PATENT HYDRAULIC RAMS for supplying small towns, mansions, &c. with water, in sites where a small fall exists.

IMPROVED TURBINE on the "Tourneyron" principle, adapted for either high or moderate falls of water.

The arrangement adopted secures compactness, easy accessibility to the working parts, a greatly improved arrangement of regulating-gate for controlling the quantity of water, and an improved method of suspension.

PATENT REGULATING VALVE, for maintaining a constant and uniform steam pressure, with a varying pressure in the boiler, applicable to any situation, or any establishment, where both high and low pressure steam are required at the same time, from one boiler or one range of boilers.

Sundry smaller articles.

[1845]

EDWARDS, C. J., & SON, 32 *Great Sutton Street, London, E.C.*—Leather bands, leather hose, and fire buckets.

[1846]

EDWARDS, RICHARD, 12 *Fairfield Place, Bow, E.*—Models of machinery for pulverising mineral, vegetable, and animal substances.

[1847]

ENGLAND, G., & CO., *Hatcham Iron Works, Hatcham*.—Screw jack.

[1848]

EVERITT, A., & SONS, *Birmingham*.—Brass, copper, and iron articles.

TUBES IN BRASS, solid drawn, for locomotive, marine, and other boilers.

These tubes are always drawn taper, to give extra thickness at the end nearest the fire. The taper is inside, and given by drawing the tubes upon steel mandrels, the outer diameter of the tube is parallel.

The expanded ends are to show the quality and ductility of the metal.

Tubes in brass and copper of various dimensions for steam, gas, &c. all drawn solid.

Tubes in brass, ornamental, rope twist, &c. for chandeliers, coronas, &c.

BRASS, COPPER, STEEL, AND IRON WIRES.

Brass, iron, and copper wires, for weaving, drawn as fine as human hair. Brass wire for pins, drawn malleable

to allow the head to be formed upon it, and sufficiently stiff not to bend.

Steel wire for springs.

Iron wire for furniture springs.

Iron wire for weaving of various colours, such as white and blue. Iron wire galvanized with copper for furniture springs.

Iron wire tinned.

Iron wire galvanized with zinc, for electric telegraphs; hank of 1 cwt. Iron wire for ropes, best charcoal quality; hank of from 30 to 40 lbs.

Brass sheets of various descriptions thin rolled brass or latten.

All these articles are made at Messrs. Everitt's Works at Birmingham. Prices, and all information can be obtained there, and at their London offices, 33 Clement's Lane, E. C.

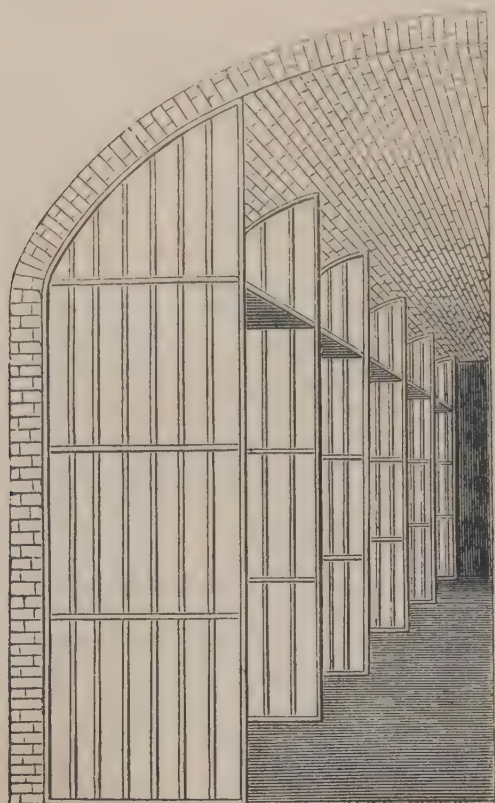
[1849]

FARROW & JACKSON, 18 *Great Tower Street, London, E.C.*—Machines, &c., used in the management of wines, spirits, oil, &c. (*See pages 20 and 21.*)

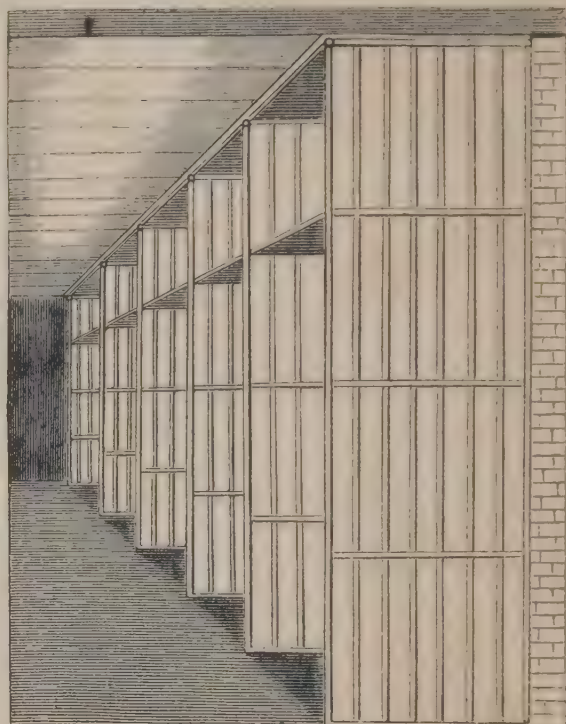
[1850]

FAWCETT, PRESTON, & CO., *Liverpool*.—Cane mill and engine; Aspinall's patent evaporating pan; vacuum apparatus; centrifugal machines. (*See pages 22 and 23.*)

FARROW & JACKSON, 18 *Great Tower Street, London, E.C.*—Machines, &c., used in the management of wines, spirits, oil, &c.

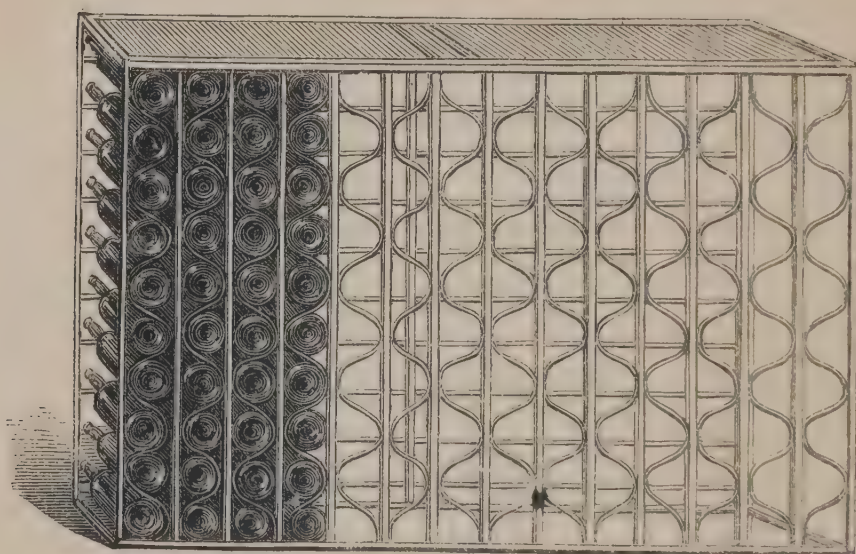


For Arched Vaults.



For Flat Ceilings.

WROUGHT-IRON WINE BINS.

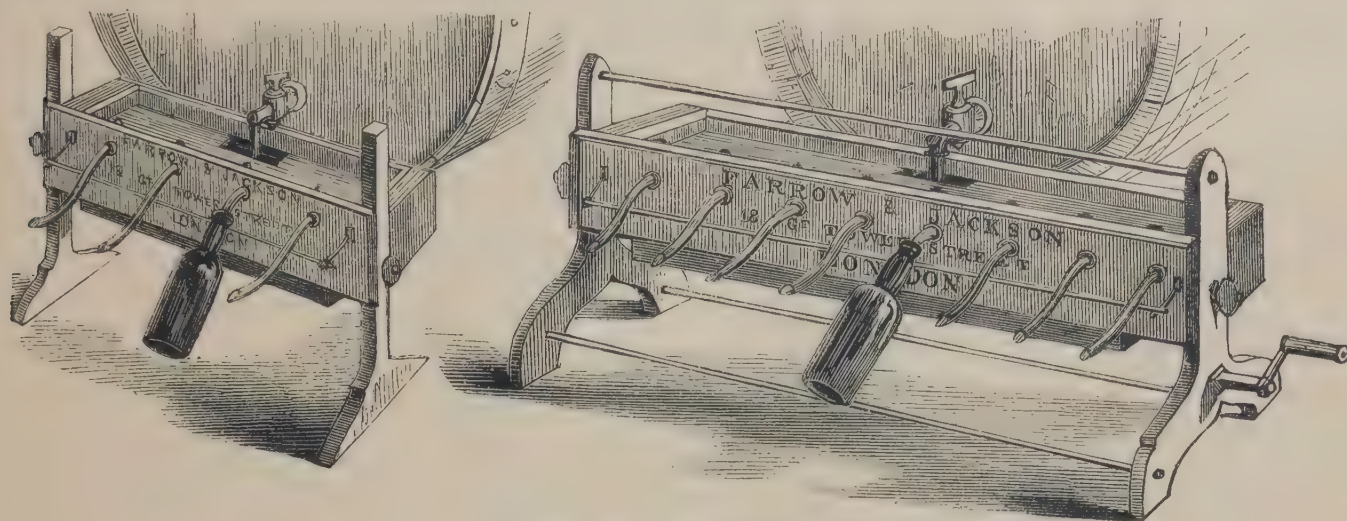


REGISTERED CELLULAR WINE BINS, WITH SEPARATE REST FOR EACH BOTTLE.

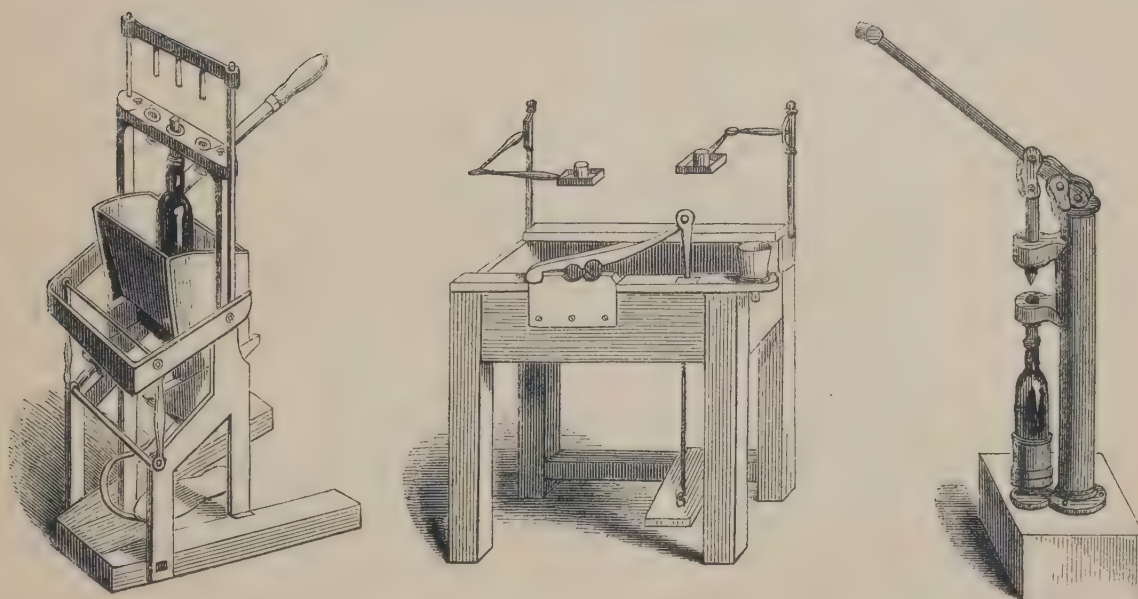


WROUGHT-IRON SCANTLING FOR CASKS.

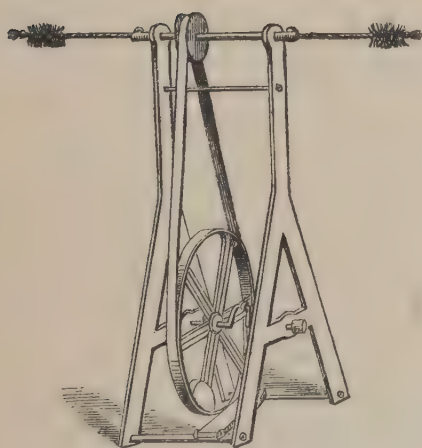
FARROW & JACKSON, *continued.*



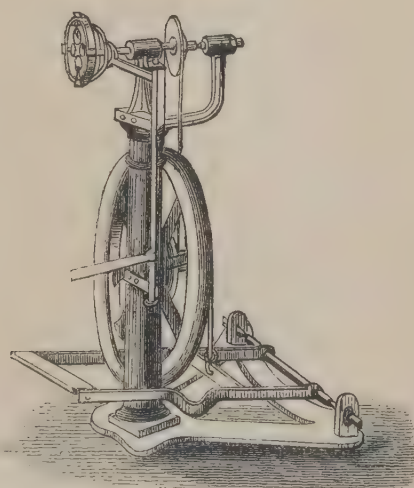
PATENT BOTTLING APPARATUS.



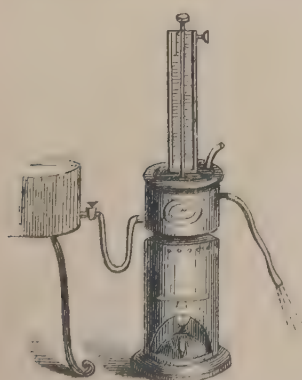
CORKING MACHINES.



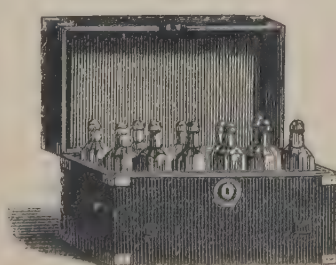
BOTTLE-WASHING MACHINE.



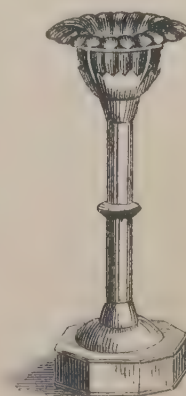
PATENT CAPSULING MACHINE.



PATENT SPIRIT INDICATOR.

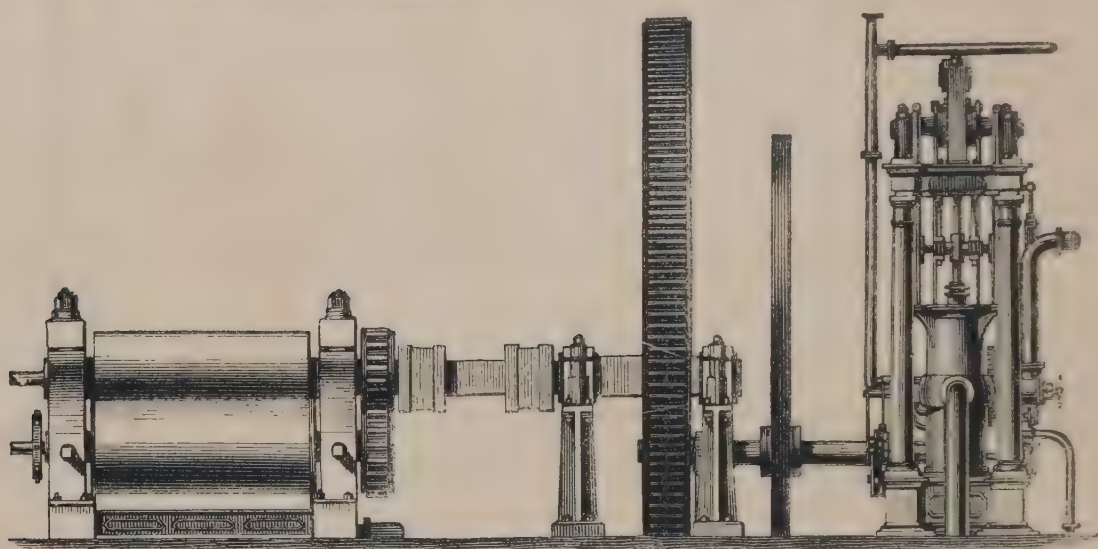
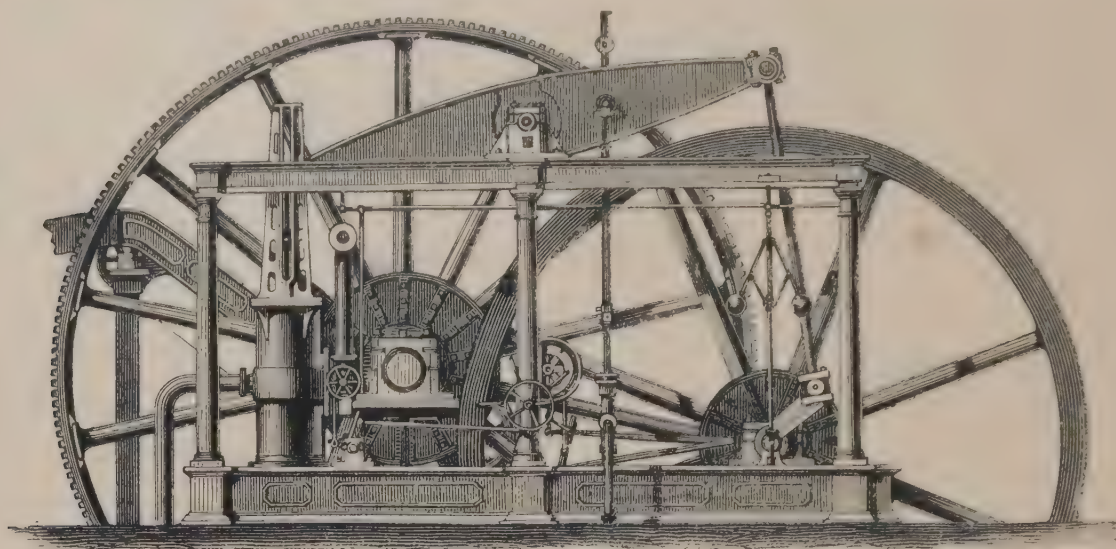


SAMPLE CASE.

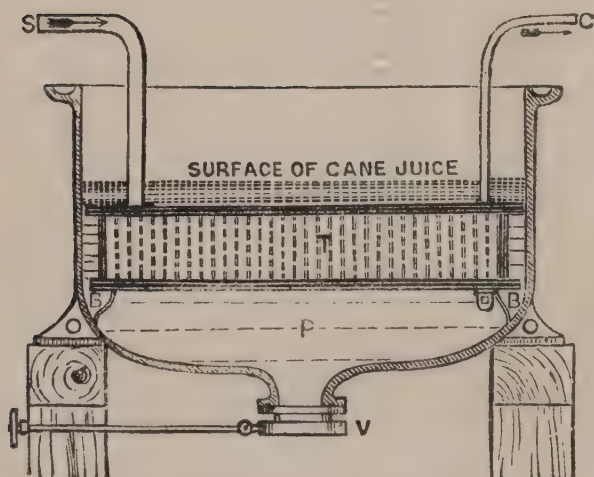


TASTING SPITTOON.

FAWCETT, PRESTON, & Co., *Liverpool*.—Cane mill and engine ; Aspinall's patent evaporating pan ; vacuum apparatus ; centrifugal machines.



NON-CONDENSING ENGINE AND SUGAR-CANE MILL.



ASPINALL'S PATENT OPEN EVAPORATING PAN.

P—Represents the pan, which is filled with cane juice to about an inch or two above.

T—The tube box or steam chest which rests upon brackets, *B*, and is fitted with vertical tubes, open top and bottom, so that the cane juice has free passage through them; the steam which surrounds the tubes being admitted through

S—The steam pipe.

C—Is the pipe through which the condensed water escapes, thus arranged to avoid joints in the pan, and to make it simple and easy to cleanse, for by lifting out the tube box it leaves only the plain pan to wash out.

V—The discharge valve, worked by a hand-wheel and screw.

O—Outside brackets on which the pan rests, so that a few pieces of timber are all that are required for its support.

B—The inside brackets on which *T*, the tube box, rests.

MESSRS. FAWCETT, PRESTON, & Co., are also manufacturers of

STEAM ENGINES—land and marine, of every description, high or low pressure, combined or condensing, &c.

DREDGING MACHINERY.

BOILERS—of wrought-iron, Cornish, plain, flue, tubular, multitubular, &c.

MILLS—for rice, corn, shumac, mortar, sugar (horizontal or vertical, driven by cattle, wind, water, or steam-power, and on De Mornay's patent); also, rolling mills for iron.

SUGAR APPARATUS of every description.

CENTRIFUGAL MACHINES—(Patent).

VACUUM PANS and APPARATUS complete.

PANS—of all descriptions; wrought and cast iron, and copper patent evaporating pans: clarifiers, cisterns, and tanks of wrought and cast iron.

PRESSES—hydraulic and screw, worked by hand or steam, for oil, cotton, grapes, &c.

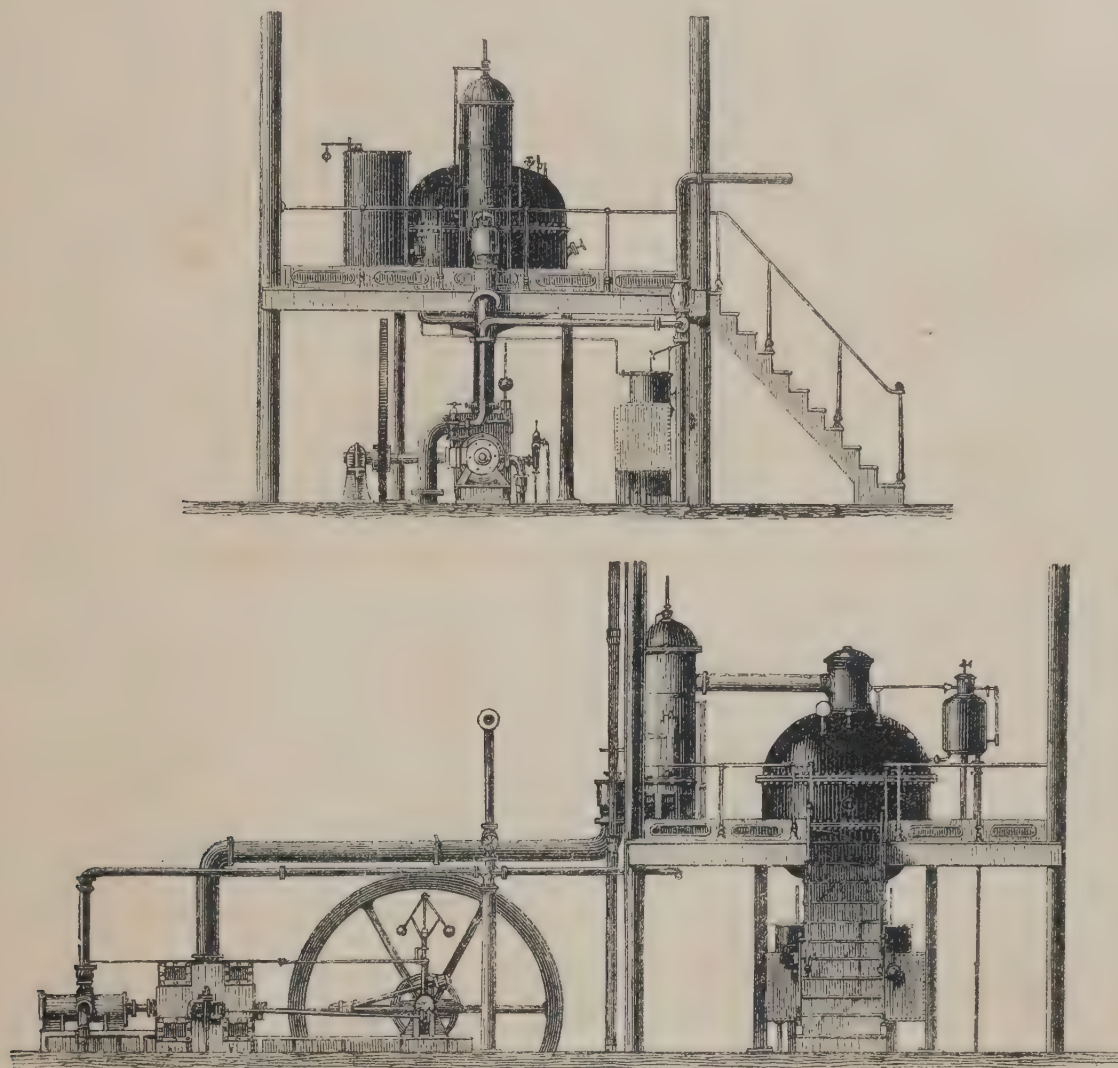
IRON ROOFS, GAS APPARATUS, COTTON GINS, &c.

ORDNANCE and AMMUNITION—smooth-bored or rifled cannon, in steel, brass, iron, and on Blakely's patent. Carriages, limbers, and ammunition waggons. Patent rifle-bullet presses.

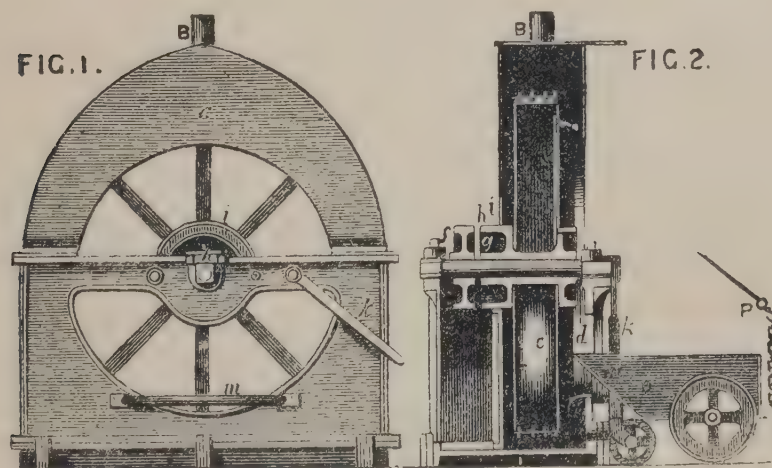
Wrought-iron work, castings, and millwright work of all kinds.

Steam vessels, dredge boats, barges, &c. &c.

FAWCETT, PRESTON, & Co., *continued.*



VACUUM APPARATUS FOR THE MANUFACTURE OF SUGAR.



THOMAS' CENTRIFUGAL MACHINES.

Fig. 1 is an elevation of one of the improved machines; and Fig. 2 is a vertical cross sectional elevation of the same, and a side elevation of one of the trucks used to feed the apparatus.

A is the external casing, provided with *B*, opening to allow the moist air to escape; *C* the revolving drum, for containing the charge to be operated upon; *D*, a conical flanch surrounding the annular opening, through which the charge is inserted; *E*, circular opening in the side of external casing, which is surrounded by an annular lip or flanch, which projects over the outer edge of the conical flanch *D*, to prevent any portion of the charge falling between the inner side of the outer cover and the outside of the revolving drum, by which arrangement the

apparatus can be charged during the time it is in motion; *F*, a loose pulley on axle of the revolving drum; *G*, a fast pulley on ditto; *H*, friction pulley on the axle of the machine, against which acts *I*, the friction strap; *K*, the lever to actuate the break gear for stopping the machine; *L*, division to prevent the syrup falling on the strap; *M*, a transverse horizontal bar, upon which the truck rests during the time it is being emptied of its contents; *O*, the improved truck for charging the machine, which is mounted on a pair of wheels, and a single one in front, the bearings of which turn on a vertical axis, to enable the carriage to be re-turned round with facility; *P*, pulley block and tackle for elevating the rear of the truck.

[1851]

FERRABEE, HENRY, 75 *High Holborn, London*.—Steam and water pressure gauges.

In these gauges the objectionable india-rubber diaphragm is dispensed with. A circular steel plate, peculiarly slit, and protected by a plate of hard rolled brass, receives the pressure of the steam, and actuates

a piston, which, by means of a sector and pinion, gives motion to the dial hand. Corrosion and friction are thus obviated, and accuracy and durability ensured.

[1852]

FERRABEE, JAMES, & Co., *Stroud, Gloucestershire*.—Direct-action high-pressure steam engine, with cut-off valve.

A 14-HORSE POWER HIGH-PRESSURE DIRECT-ACTION STEAM ENGINE, fitted with governor, cut-off valve,

feed pump, and fly wheel, mounted in a substantial iron frame, and self-sustained.

[1853]

FLEET, BENJAMIN, *East Street, Walworth. S.*—Steam soda-water machine, with patent bottling apparatus affixed. (*See page 25.*)

[1854]

FORREST & BARR, *Glasgow*.—Patent safety derrick crane, for engineers, foundries, contractors, wharves, railways, quarries, and builders.

[1855]

FORRESTER, GEORGE, & Co., *Vauxhall Foundry, Liverpool*.—Triple-effect vacuum pan apparatus and air pumps, for His Highness Prince Halim Pacha, Egypt. (*See page 26.*)

[1856]

FOWLER, BENJAMIN, & Co., *Whitefriars Street, Fleet Street, London*.—Force pumps, fire engines, and hydraulic rams. (*See page 27.*)

[1857]

FRIEAKE & GATHERCOLE, 81 *Mark Lane, City*.—Salinometers, engine counters, telegraph indicators, and engine-room fittings.

[1858]

GALLAGHER, JOHN, *Wolverhampton*.—Improved self-acting bottling machine.

THIS IMPROVED SELF-ACTING BOTTLING MACHINE is adapted to fill 6, 8, or 10 bottles simultaneously, and

will be found of important service to bottlers of wine, spirits, and malt liquors.

[1859]

GALLOWAY, WILLIAM & JOHN, *Manchester*.—Models of land and marine boilers; safety valve and lifting-jack.

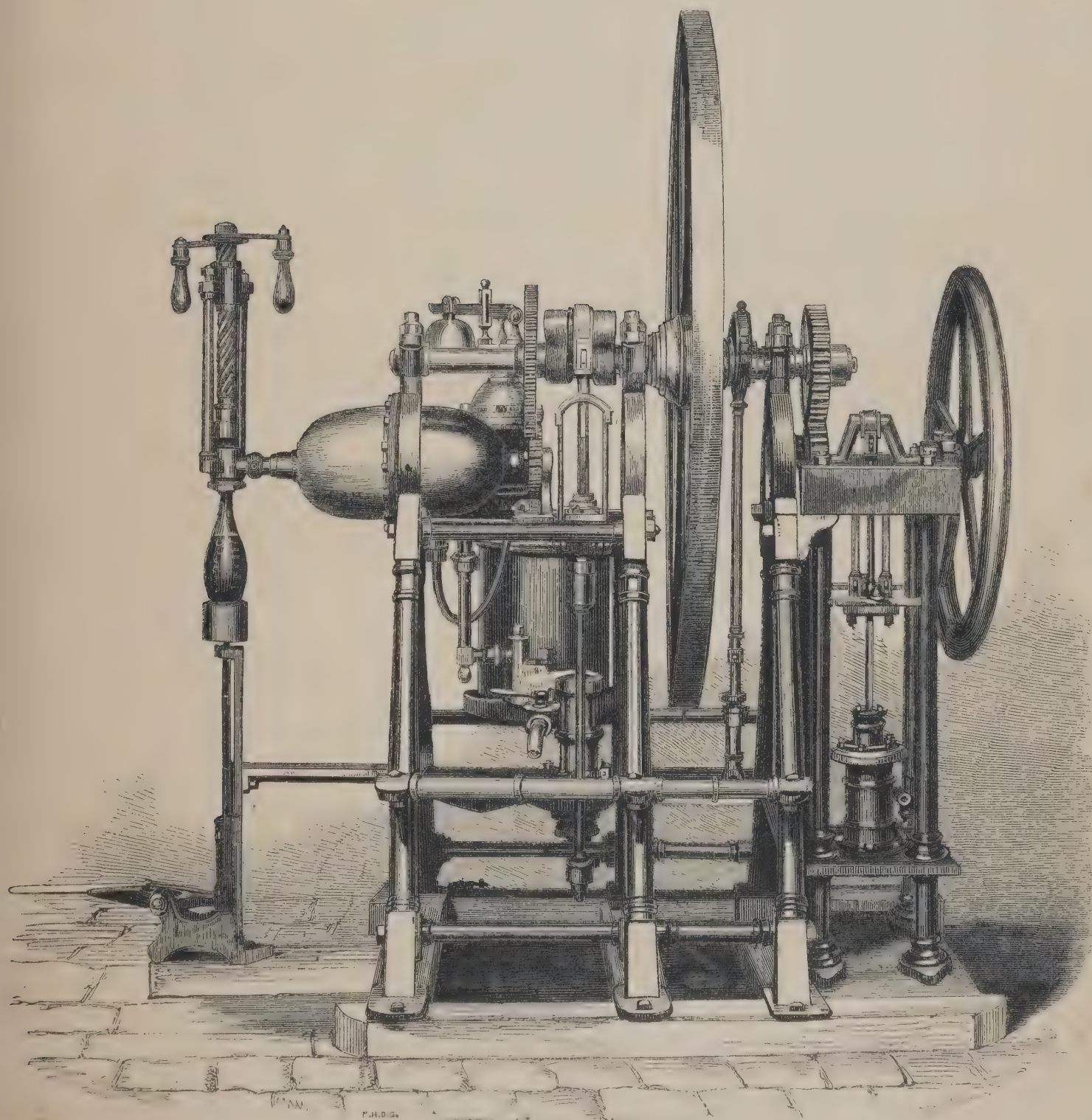
[1860]

GERARDIN & WATSON, 43 *Poland Street, Oxford Street, London*.—Watson's patent beer engine, and tavern bar fittings.

FLEET, BENJAMIN, *East Street, Walworth, S.*—A steam soda-water machine, with patent bottling apparatus affixed.

This STEAM SODA-WATER MACHINE is an improved method of manufacturing and bottling soda-water, lemonade, ginger-beer, and all kinds of mineral waters and aerated drinks, by means of a patent screw bottling apparatus, which forces the cork into the bottle without the aid of a mallet, and being elevated by a treadle; and pressed firmly against a suitable packing ring, on the

under side of the filling piece, the air is excluded, and the otherwise dangerous operation entirely prevented. A further improvement is the application of a small steam cylinder, combining in one machine, the apparatus for making the soda-water, and a steam engine for driving the same, which being connected to the same shaft, the fly wheels answer the purpose of both.

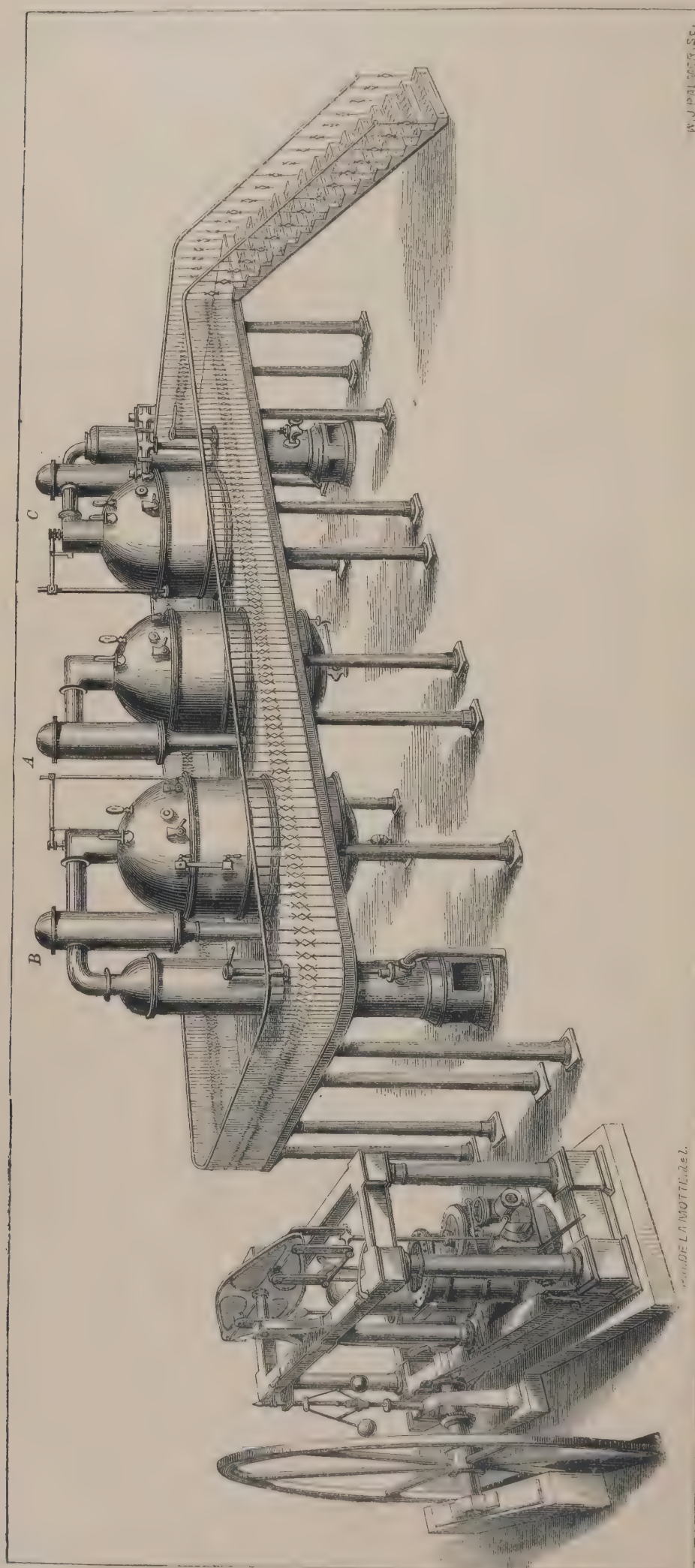


SODA-WATER MACHINE.

The machine produces 2,500 bottles per day (or over 200 doz.), and the principal features of the invention are the mechanical contrivances for the entire exclusion of all atmospheric air, and the ease with which it can be worked by non professional men.

The great success which has attended its working by the exhibitor, proves that from its solidity of construction, power, and completeness, it is a great acquisition to this increasing branch of trade.

FORRESTER, GEORGE, & CO., *Vauxhall Foundry, Liverpool*.—Triple effect vacuum pan apparatus and air pumps, for His Highness Prince Halim Pacha, Egypt.



METHOD OF WORKING THE APPARATUS.

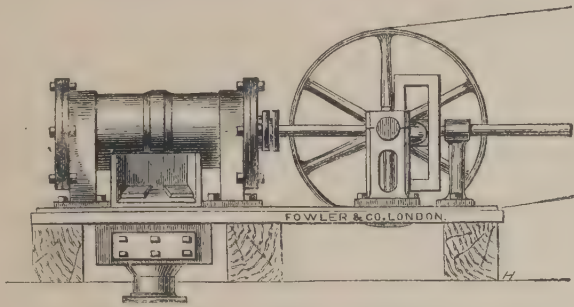
VACUUM PAN APPARATUS, for the manufacture and refining of sugar, constructed for and exhibited at the request of His Highness Prince Halim Pacha, brother to His Highness the Viceroy of Egypt.

The desiccated and filtered cane juice is received into the centre pan *A*, which contains a number of copper tubes surrounded by steam; the juice is here evaporated to a density of 15° to 18° Beaumé, after which it is discharged into the pan *B*, to be still further evaporated to a density of 28° Beaumé by means of the vapour formed by the evaporation of the juice in the pan *A*.

After leaving this pan the concentrated juice is passed through filters containing animal charcoal, and is then received into and finished in the vacuum or strike pan *C*.

G. Forrester & Co. are engineers, millwrights, and iron-founders, makers of stationary, marine, Cornish, and other pumping engines, steam boilers, steam dredging machines, cranes, gas works, sugar works, sugar mills, saw mills, corn mills, hydraulic and other presses for cotton, hay, oil, &c.; centrifugal pumps, water wheels, cast-iron and wrought-iron girder bridges; millwork and shafting, improved roller and other cotton gins, turntables, cokers, &c. &c.

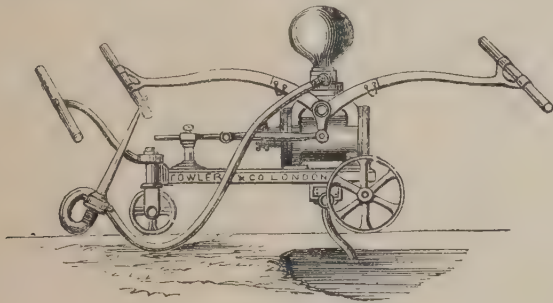
FOWLER, BENJAMIN, & Co., *Whitefriars Street, Fleet Street, London.*—Force pumps, fire engines, and hydraulic rams.



HORIZONTAL DOUBLE-ACTION PUMP.

1. FOWLER'S IMPROVED HORIZONTAL DOUBLE-ACTION PUMP (No. 143) for contractors' use, irrigation, and other purposes.

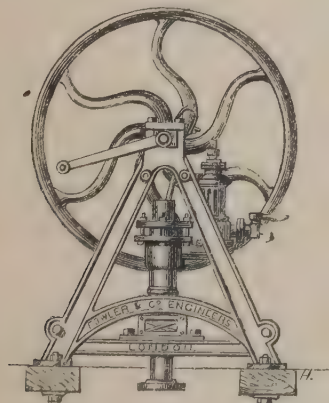
This pump is arranged either to lift large quantities of water from excavations, cuttings, docks, mines, &c., and delivering over embankments or through other channels; or it is suited for raising water, and forcing it through lengths of piping to any elevation required. Its merit consists in its extreme simplicity, and the ready means of working it direct from a portable or other steam engine. The pump discharges an equal quantity at both strokes of the plunger, and the valves are readily accessible.



FIRE ENGINE.

2. FOWLER'S NEW AND IMPROVED FIRE ENGINE (No. 142), for towns, public buildings, mansions, manufactories, &c.

The principle of this pump is similar to the foregoing; it throws a large supply of water at both strokes of the plunger, the valves are readily accessible, it is fitted with an air vessel, and inlet and outlet unions, to connect hose piping, and with long handles at each end; it is mounted on a stout carriage, with wheels and drag handle. Its advantages are, great simplicity and few working parts, one barrel is made to do the work of two. It is well adapted for hot climates, as it will always be found ready for work after lying out of use.



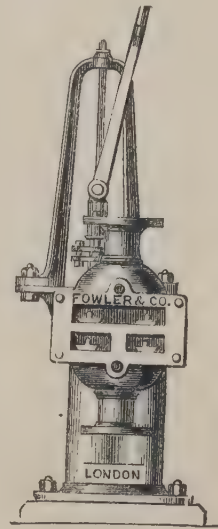
DOUBLE-ACTION PUMP.

3. FOWLER'S IMPROVED DOUBLE-ACTION PUMP, mounted in frame with fly-wheel and handles (No. 138).

This pump is fitted with gun-metal plunger and brass bucket, and delivers the water at both up and down strokes in a constant stream. It is well adapted for supplying railway stations, public and private establishments, also for fixing on water lighters to supply ships with fresh water through hose pipes.

4. FOWLER'S IMPROVED DOUBLE-ACTION PUMP (No. 141), of a similar description to foregoing, mounted on base with pillar, forming air vessel and gear for driving by steam power.

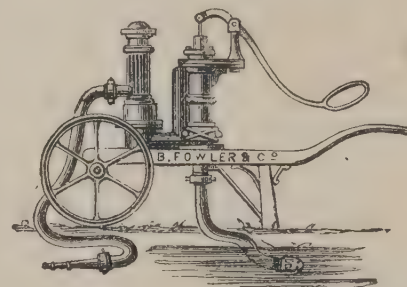
This pump is adapted for manufactories, and other places where large quantities of water are required.



HOLMAN'S DOUBLE-ACTION PUMP.

5. HOLMAN'S PATENT DOUBLE-ACTION PUMP (No. 75), for steam power.

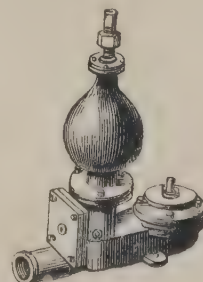
The advantage of this pump consists in the valve arrangements, being all contained in one chamber, readily accessible by the removal of a single plate.



DOUBLE-ACTION HAND FORCE PUMP.

6. FOWLER'S IMPROVED DOUBLE-ACTION HAND FORCE PUMP mounted on barrow (No. 46a).

This useful and powerful pump is well adapted for watering gardens, forcing water to a distance; for use as a small fire engine, and for a variety of useful purposes. It is thoroughly well fitted, and very economical in cost.



HYDRAULIC RAM.

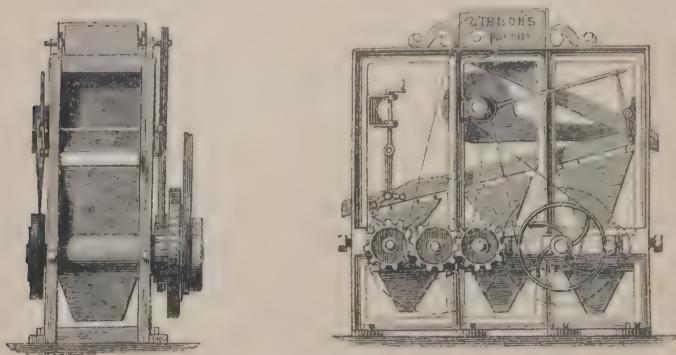
7. The IMPROVED HYDRAULIC RAM (No. 60), for raising water for the supply of mansions, farms, &c. from a stream, brook, or spring, where a fall can be obtained. By this means water may be conveyed to a great distance and height.

This machine is entirely self-acting, and is capable of raising water 10 ft. high for every foot of fall obtained.

The figures in brackets relate to the numbers the various articles bear in B. Fowler & Co.'s general list.

[1861]

GIBBON, RICHARD, *Royal Brewery, Brentford, Middlesex.*—Combined separating, dressing, malt crushing machine.



PATENT MALT-CRUSHING MACHINE.

This machine will thoroughly separate, dress, and evenly crush malt, however irregular in size the sample may be, without reducing any to powder, consequently obtaining an increased extract. An adjustable balance is affixed, showing both specific gravity and the extract obtainable per quarter.

A descriptive catalogue with prices, may be had of the patentee; and also manuscript instructions for brewing India pale ale as brewed at Burton-on-Trent.

[1862]

GODWIN, RICHARD A., 151 *Newport Street, Lambeth.*—Flood pump, double-actioned; retaining and other valves accessible by simply raising outlet valve.

The working parts being entirely at command, any "stoppage" that cannot be immediately remedied is impossible. As cheap and efficient water raisers they are unequalled; one man with a 4-in. pump, 6-in. stroke, discharging 1,455 gallons of water per hour, being but

15 gallons less than the actual gauge of cylinder, or with 1 per cent. loss. They can be made of any capacity; need no fixing; and their arrangement is so simple that any repairs required to keep them in effective working condition can be done by any unskilled hand.

[1863]

GOODALL, H., *Derby.*—Machines for grinding and making bread, &c. (*See page 90.*)

[1864]

GOUGH & NICHOLS, *Back Quay Street Works, Manchester.*—Improved vertical portable engine, for contractors and others.

[1865]

GRAUTOFF, B. A., & Co., 4 *Lime Street Square, E.C.*—Steam and vacuum gauges and salinometers.

[1866]

GRAY, JOHN WILLIAM, & SON, 114 *Fenchurch Street, City, and 1 Margaret Street, Limehouse.*—Patent spherical steam engine.

[1867]

GREENING & Co., *Victoria Iron Works, Manchester.*—Fixed oscillating steam engine, with simplified surface valve.

[1868]

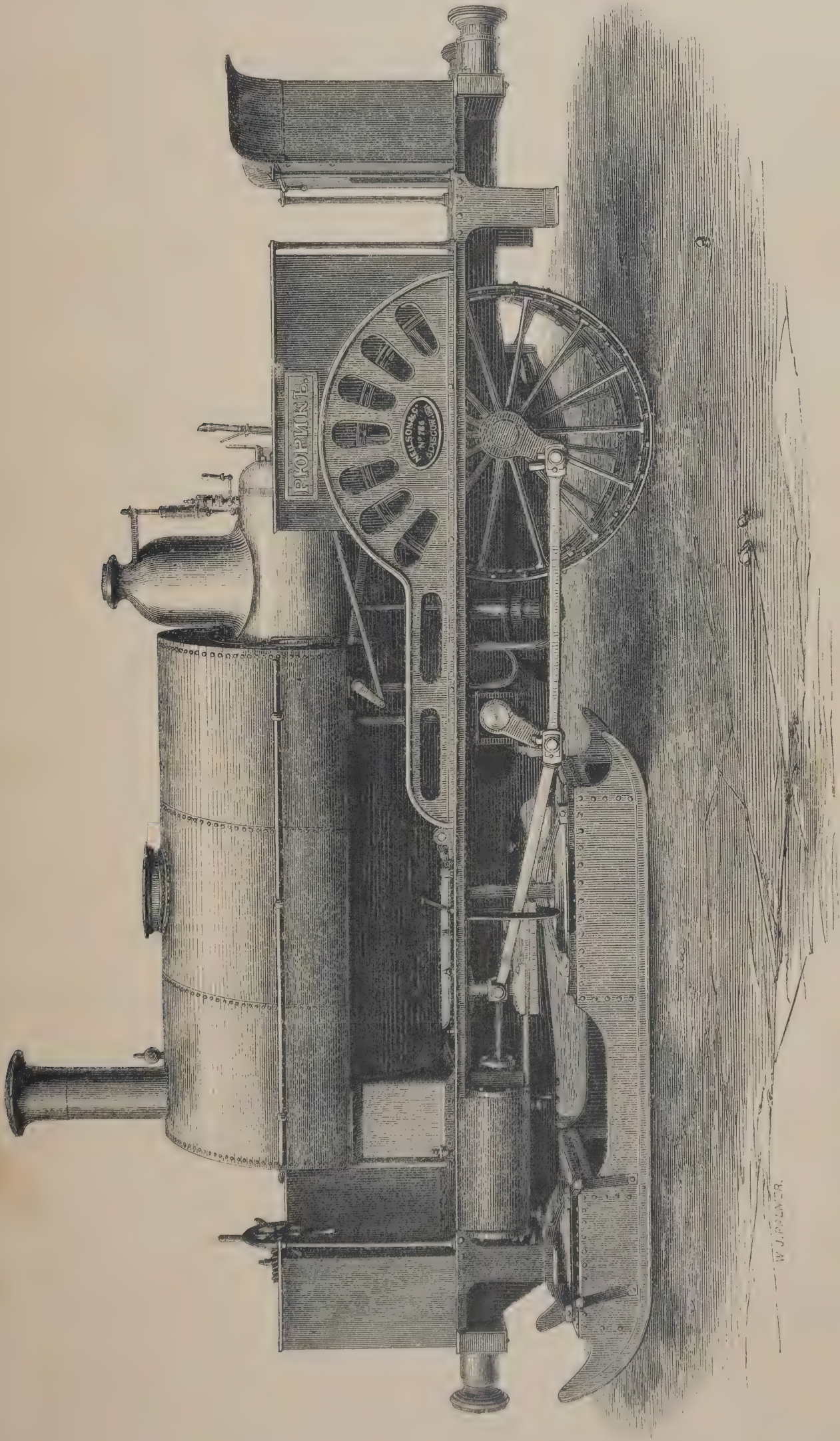
GREW, NATHANIEL, 8 *New Broad Street, City.*—Model of a locomotive engine for running on the ice; scale one-eighth full size.

A model showing the general construction of an ICE LOCOMOTIVE sent to Russia last autumn, which has been successfully at work during the winter on the river Neva, between Cronstadt and St. Petersburg, conveying passengers and goods.

The full-size engine, of which a photograph is exhibited, was constructed by Messrs. Neilson & Co. of Glasgow, and bids fair to be a very useful agent, on the great rivers, and inland seas of Russia in transporting

goods, &c. when the ordinary navigation is closed. The engine when in working trim weighs about 12 tons, has cylinders of 10 in. diameter by 22 in. stroke, with driving wheels of 5 ft. diameter; these wheels are studded with steel spikes to obtain the necessary adhesion. The steering of the engine is accomplished, by shifting the front sledges in the required direction by means of an endless screw and worm wheel, working a pinion, gearing into a circular rack bolted to the sledge.

GREW, NATHANIEL, *continued.*



ICE LOCOMOTIVE. DESIGNED BY NATHANIEL GREW, A.I.C.E.

[1869]

GRIMALDI, FILIPPO, & Co., 30 *Bucklersbury, City*.—Rotatory boilers, the cheapest steam generators and superheaters.

[1870]

GWYNNE & Co., *Essex Street Wharves, Strand*.—Gwynne & Co.'s patent double-acting centrifugal pump, worked by a pair of their horizontal steam engines.

[1871]

HACKWORTH, J. W., *Darlington*.—Condensing engine and model.

[1872]

HANCOCK, J. & F., & Co., *Tipton Green Furnaces, Staffordshire*.—Improvements in condensing engines, by which a more effective vacuum is obtained in the cylinder.

[1873]

HANDS, JOHN, *Cardigan Street, Birmingham*.—Horizontal steam engine, 2-horse power.

[1874]

HANDYSIDE, ANDREW, & Co., *Derby*.—Brewing machinery.

HOP SEPARATOR—(Hodge's patent).

PAIR OF DOUBLE-ACTING HYDRAULIC PUMPS, for working this press.

HYDRAULIC DOUBLE-ACTING PRESS, used for compressing hops and other materials.

These machines are used at Messrs. Allsopp & Son's new brewery, Burton-on-Trent.

[1875]

HARGREAVES, WALMSLEY, *Crawshaw Booth, Manchester*.—Waterfall washing machine.

[1876]

HARLOW, R., *Stockport*.—Multitubular fire bridge and heat generator shown in section of steam boiler.

[1877]

HARRISON, JOSEPH, 8 *New Broad Street*.—Patent cast-iron boiler.

IMPROVED STEAM BOILER, system of Joseph Harrison, Jun., Philadelphia, United States.

When repaired, it will, in all the renewed parts, be equally good as when new.

The advantages claimed for this boiler are—

1. Adaptation.—It may be adapted to any form or use (particularly to mining or ordinary stationary purposes), and is available in places of difficult access, or where the materials, skill, and means could not be easily had for making boilers of the usual kind.

2. Capacity for sustaining pressure.—It will sustain with entire safety 2 or 3 times greater pressure than the boilers in general use, and from being the multiplication of a single unit, entire uniformity of strength in all its parts is secured, no matter how large the boiler may be made. It has been proved by hydraulic pressure of 500 lbs. to the square inch without injury.

3. Facility of repairs or renewal.—It has less than ordinary liability to get out of order. It can be renewed in any part when necessary, much more speedily, and at much less cost than boilers of the usual construction.

4. Explosion.—Serious explosions cannot occur in boilers of this construction, either from weakness of parts, too great pressure, or lowness of water. Under circumstances that would cause violent rupture in other boilers, every joint in this becomes a safety valve.

5. Facility of cleaning.—It can, by very simple means be kept free from injurious deposit, or incrustation in all its parts, with greater ease and certainty than boilers of the ordinary kind.

6. Facility of transportation.—However large the boiler may be, it can be carried in detail by a single man, and, if necessary, may be put into place, through an opening not more than 3 ft. square.

7. Economy of manufacture.—It can be made and kept in order at about one-half the cost of the boilers now generally used for stationary purposes. It will last equally long, and when worn out, the value of the old material will be much greater, in proportion to the original cost.

[1878]

HARRISS & RISSE, *New Oxford Street*.—Pressure gauges.

[1879]

HART, DAVID, *Whitechapel Road, London*.—Patent weighing crane, weighbridge for waggons, &c., and dormant and portable weighing machines.

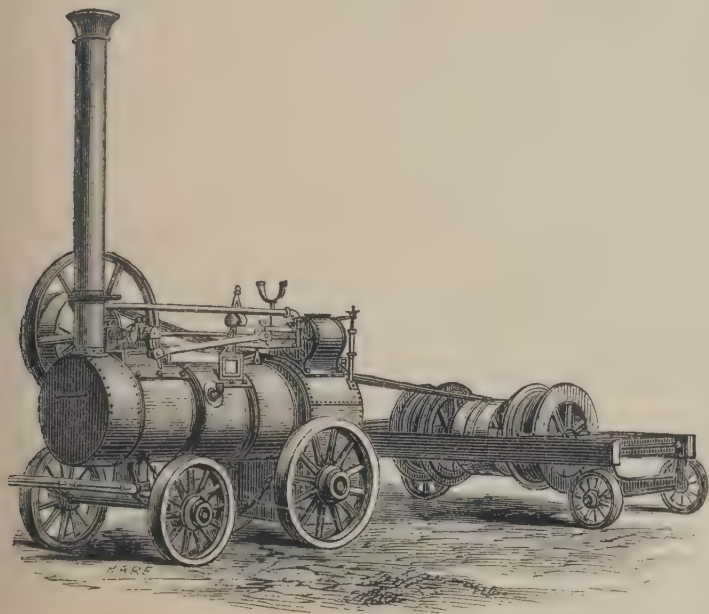
[1880]

HARVEY & Co., *Hayle, Cornwall*.—Model of pumping engine for London water companies, and a model of safety apparatus. (See pages 32 and 33.)

[1881]

HAYES, EDWARD, *Watling Works, Stony Stratford*.—Portable steam engine; patent self-acting windlass for steam ploughing.

Obtained the Royal Agricultural Society's Silver Medal at Leeds, 1861.



HAYES' PATENT WINDLASS possesses the following advantages, which are peculiar to it alone, viz.—

The cultivator or plough can be instantly stopped by the anchormen at the headland, without stopping the engine, the engine continuing in motion as in thrashing or other work.

No signals are required; the work may be performed in foggy weather, or by moonlight, with perfect safety to the machinery.

One man can superintend both engine and windlass. A double-cylinder engine not required as the engine is not stopped.

No wheels are required to be put in or out of gear.

E. HAYES'S 8 and 10 HORSE ENGINES, designed and built extra strong for steam cultivation. Further particulars may be learned by reference to his catalogue.

OPINIONS OF THE PRESS.

In the notices of the Royal Agricultural Trials, Leeds Show, 1861.

Extract from THE TIMES, July 17th, 1861.—"Mr. Hayes, of Stony Stratford, exhibited a very clever windlass on the coiling principle."

THE ENGINEER, July 19th, 1861.—"The self-acting windlass of Mr. Edward Hayes, of Stony Stratford, was one of the important novelties in the show."

LEEDS MERCURY, July 15th, 1861.—"As a piece of mechanism this deserves as much attention as anything in the field."

BELL'S WEEKLY MESSENGER, July 15th, 1861.—"The construction of this machine was greatly admired."

MARK LANE EXPRESS, July 15th, 1861.—"Mr. Hayes, of Stony Stratford, has a novel form of windlass."

[1882]

HEPBURN & SONS, 25 *Long Lane, Bermondsey, London*.—Machine belts and leather.

[1883]

HERKLESS, WILLIAM, *Broad Close, Shuttle Street, Glasgow*.—Machine for grinding tanners' bark.

[1884]

HILL, JOHN, *Ashford, Kent*.—Improved flour dressing machine, with silent feed, revolving cylinder, and outside brush.

[1885]

HOLGATE, J., & CO., 33 *Dover Road, Southwark*.—Leather mill bands and hose pipes.

[1886]

HOLMES, F. H., *Northfleet, Kent*.—Magneto-electric machine and light; lighthouse regulators.

[1887]

HOPKINSON, J., & CO., *Huddersfield*.—Patent compound safety valve, steam engine indicator, mercurial steam and vacuum gauge, &c.

[1888]

HORTON, SON, & KENDRICK, *Southwark, London*.—Models of high pressure, marine and land steam-engine boilers.

[1889]

HOWORTH, JAMES, *Victoria Works, Farnworth, near Bolton*.—Patent self-acting Archimedian screw ventilators.

[1890]

HUGHES, J., & SONS, 91 *Dover Street, Borough*.—Millstones.

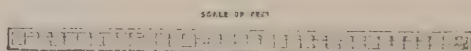
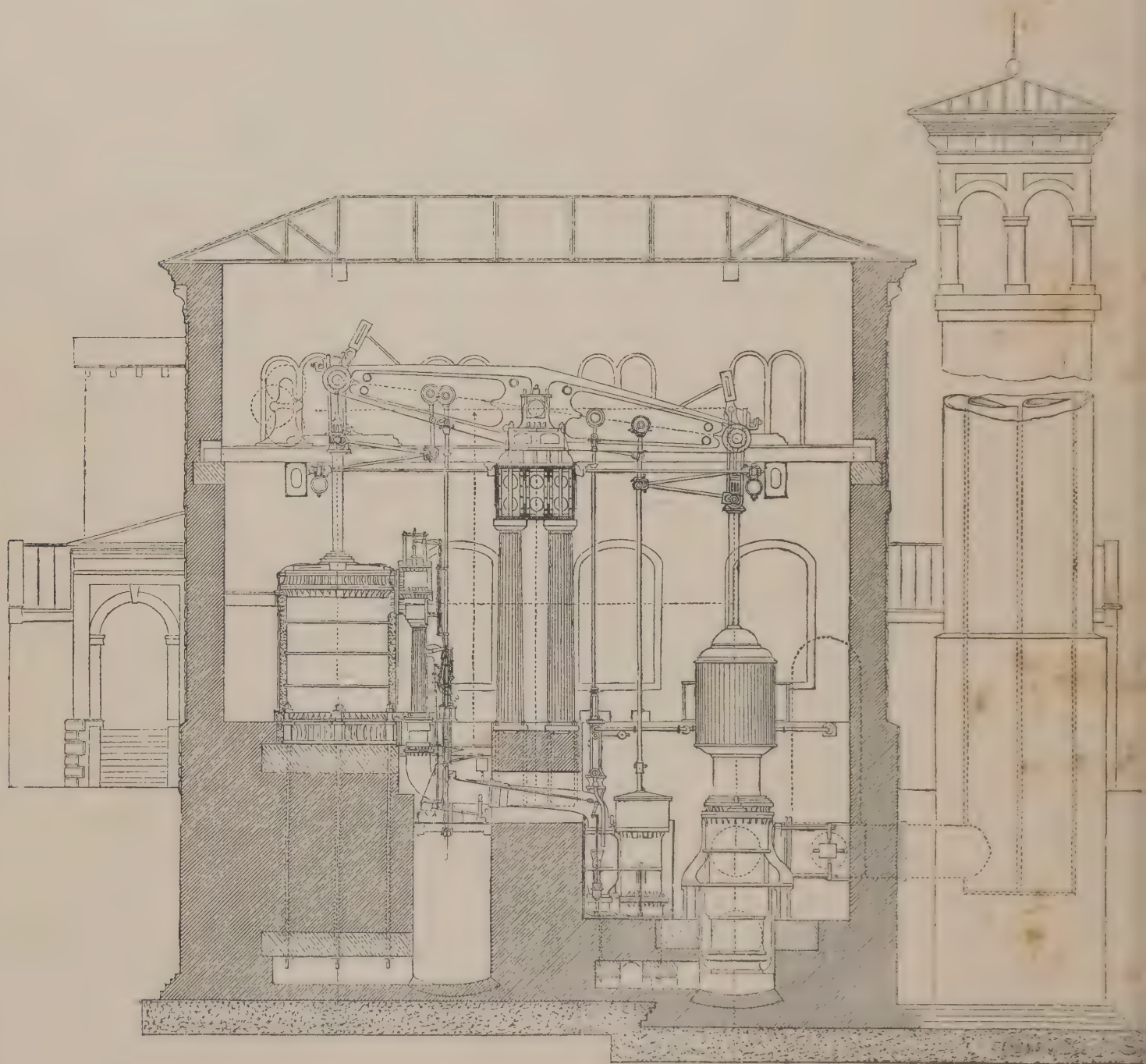
[1891]

HUMPHREYS & TENNANT, *Deptford Pier*.—Marine engine.

HARVEY & Co., *Hayle, Cornwall.*—Models of pumping engine for London water companies and of a safety-balance valve.

The accompanying engraving represents a SINGLE-ACTING CONDENSING ENGINE, on the Cornish principle, erected by Harvey & Co. engineers and founders, Hayle, Cornwall, and 12 Haymarket, London, for the East

London Waterworks Company, at Lea Bridge. The cylinder is 100 in. diameter, and working stroke 11 ft. The pump is a plunger, 50 in. diameter, and 11 ft. stroke.



SINGLE ACTING PUMPING ENGINE.

This engine, when working full power, pumps about 9,000 gallons of water per minute, usually 140 ft. high, which water is conveyed into London by cast-iron pipes 36 in. diameter. The model exhibited

by the above firm closely approximates to this engine. At the time of its erection in 1855, this was the largest machine for supplying water to towns ever constructed.

HARVEY & CO., *continued.*

In 1858, Harvey & Co. erected for the Southwark and Vauxhall Water Company at Battersea, a pumping engine, the cylinder of which is 112 in. diameter, weighing with its case 36 tons.

This engine, although the largest and most powerful ever built for such purposes, is of the most simple construction; the steam valves are all on the equilibrium principle, and the arrangement of parts is such, that this colossal engine is as completely under control as those of the smallest size, and performs an enormous amount of work, without the slightest shock or noise.

The total quantity of water pumped for the supply of London daily amounts to 115,000,000 gallons. Of this large amount 79,000,000 of gallons are pumped by the single-acting engine, and considering that Harvey & Co. have erected nearly all the machinery for pumping the latter amount, and about 25 years ago first introduced into London this machine, of which the above-mentioned engines are examples, that firm has thought it advisable to exhibit a working model of a pumping engine, supplied with Harvey & West's valves, and complete in every respect. The pump of this model with the valve boxes are partially constructed of glass, thus allowing the action of the valves to be observed.

Like all great improvements, this class of engine has met with much opposition. Gradually but surely, however, it is superseding all others for supplying towns with water, and for all drainage purposes, and as now improved, it stands unrivalled for economy and durability. This is sufficiently proved by its adoption by the Southwark and Vauxhall, the Kent, the West Middlesex, the Grand Junction, and the East London Water Companies. The above companies now use this engine exclusively, and effect by so doing a very large saving of fuel. Some of these companies have worked their engines without intermission for twenty years, without requiring to stop for repairs.

The single-acting engine having been employed with such entire success for pumping water into London, it appears surprising that the same plan of engine is not to be employed for pumping the water out again in the form of

sewage. An experiment is to be tried at Deptford with rotative engines, for pumping the sewage up from the low level sewers, thus going back to the plans adopted in London before the introduction of the single-acting engine, regardless of the experience of the most eminent water-works engineers in London. It is very desirable however, considering the immense interests at stake, that this question should be thoroughly investigated, before a farther outlay be decided on. For as the cost of working steam engines, and maintaining them in repair is a *daily charge*, a step in the wrong direction would entail enormous loss on the City of London, and the evil would be irremediable.

Harvey & Co. have had great experience in the manufacture of machinery for stamping and crushing ores. The space allotted however does not admit the introduction of models. This business has of late years become of great importance since the gold discoveries in Australia and California, and as future success in those countries, must depend on mining, suitable machinery for crushing and stamping, will daily become of greater importance.

The above firm have constructed pumping machinery expressly adapted for draining gold workings in Australia or other distant countries. Wrought-iron is substituted for cast-iron wherever practicable, thus at once decreasing cost of transport by reducing the weight; and diminishing the risk of breakage to a minimum. This is even of more importance for the pumps than for the engine, as the weight of lifts is thereby so much lessened that the labour of fixing is reduced by about one-half.

The model exhibited is a type of these machines for draining mines, and by it the method of working may be readily understood even by those not intimately acquainted with the subject.

MODEL OF A SAFETY-BALANCE VALVE.

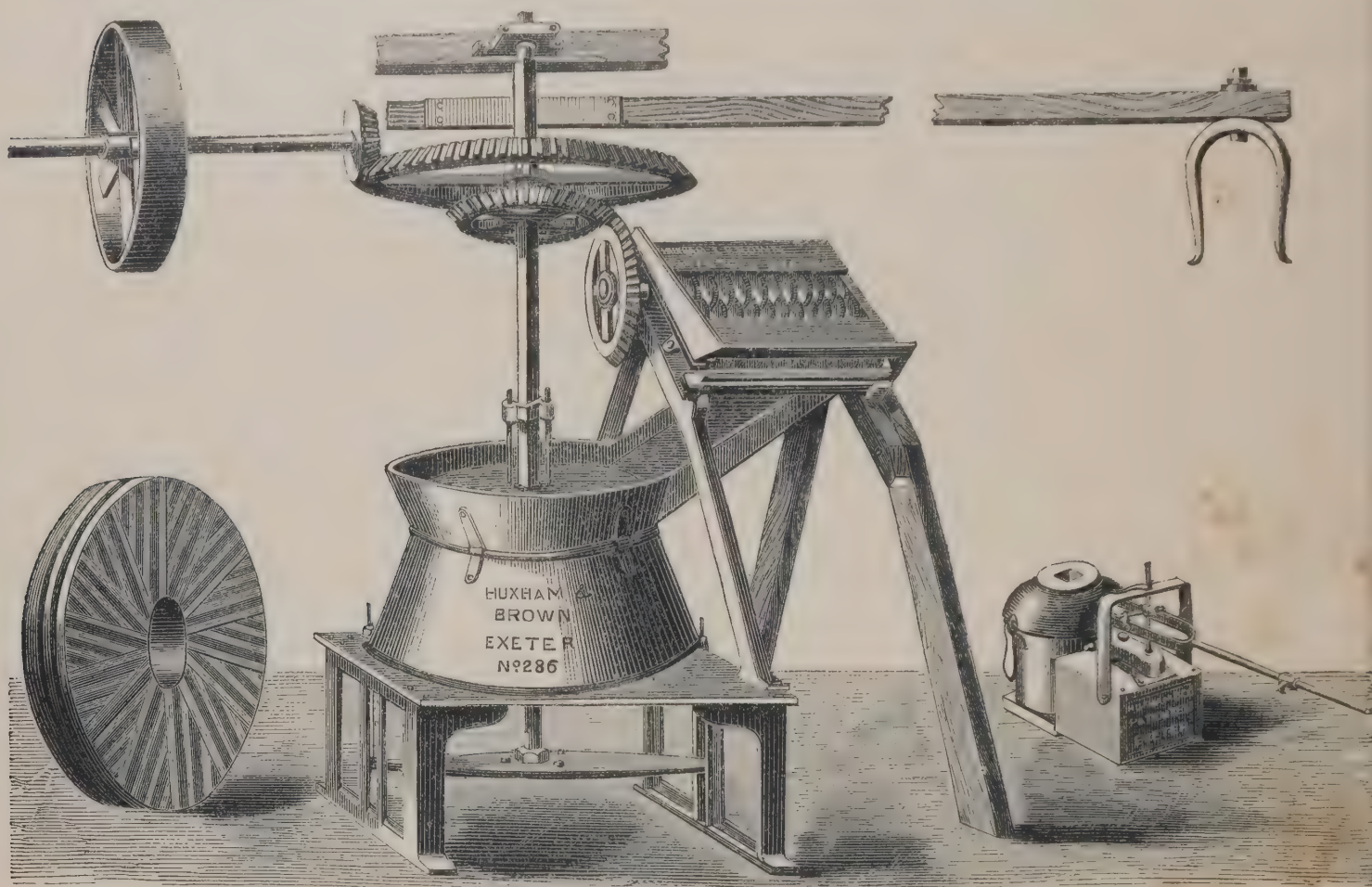
This is a model of a SAFETY-BALANCE VALVE, patented by W. Husband, and made by Harvey & Co. for pumping engines. It is fixed in and forms part of the main pipes for conveying the water; by its action an engine always retains its load in case the main should burst. It performs the office of a stand pipe, and dispenses with this costly structure.

[1892]

HURRY, HENRY C., *Rookswood Villa, Worcester*.—An electro-magnetic motive engine.

[1893]

HUXHAMS & BROWN, *Exeter*.—Mill to grind bark for tanners; hydraulic lifts to raise ships and heavy weights, French burr millstone to grind wheat.



Obtained a Medal at the Paris Exhibition, 1855.

TANNERS' BARK MILL, grinding in the best manner for English tanneries, 25 cwt. a day by one horse, and about 5 tons a day by four-horse steam power. It separates the fibres of the bark thoroughly, therefore the tannin can be more easily extracted. It is not necessary to chop the long bark for this mill, as it shortens the bark, tears and grinds it at one operation. Price £45 0

HYDRAULIC LIFT, raises or pushes heavy weights with far greater ease and much less cost than screws. Ships of

from 200 to 400 tons can be gradually raised by it. One man and a boy have lifted with it a ship of 250 tons. It is useful for a variety of heavy work, and wherever a severe strain is to be slowly overcome.

Price £14 14

MILLSTONE of the best description of French burr for flour, not of the closest or hardest burr; will do the best miller's work for fine flour, except when the wheat is extremely hard; though full of fine pores which give cut to the last. Easier to dress well than closer stones.

[1894]

IMPERIAL IRON TUBE COMPANY, *Birmingham*.—Iron, brass, and copper tubes, and fittings for boilers, gas, steam, water, &c.

[1895]

IMRAY, JOHN, 65, *Bridge Road, Lambeth*.—Improved horizontal and vertical steam engines.

HORIZONTAL AND VERTICAL DIRECT-ACTING HIGH PRESSURE STEAM ENGINES, of the most simple and substantial construction.

2 horse power vertical £35 0

5 horse power, vertical	£80 0
7 ditto horizontal	110 0
12 ditto ditto	180 0
20 ditto ditto	280 0

[1896]

INGLIS, A. & J., *Glasgow*.—Two drawings of the 200-horse power engines of H.M. Steam-ship "Chanticleer."

[1897]

KEY, JOHN, *White Bank, Kirkcaldy*.—Horizontal direct-acting screw engines of the collective power of 80 horses.

The exhibitor is a designer and manufacturer of horizontal direct-acting screw engines, of oscillating paddle wheel steam engines, boilers, &c. &c. Prices and other particulars may be learned by application.

[1898]

KING, C. B., 20 *Abingdon Street, Westminster*.—Design for traction engine and steam carriage.

[1899]

KING, J. CHARLES, 12 *Portland Road, Regent's Park, W.*—Tubular carriage axle, and wood washers.

[1900]

KIRKALDY, JOHN, & SONS, 166 *Wapping*.—Ship's portable fire engine.

[1901]

KNOWELDEN & CO., *Park Street, Southwark*.—Patent pumps, valves, hydraulic motive engines and cranes, safety valve, &c.

1. KNOWELDEN & EDWARDS'S PATENT DIAPHRAGM PUMPS.

The working barrel of these pumps, protected by the diaphragm, are uninjurably from grit, sewage matter, and all such causes, which act injuriously on the working barrels of all other pumps. The valves can be withdrawn, and any impediment to their free action, removed, and replaced in a minute. By the reversal of the handle the suction pipe becomes the outlet one, through which water may be forced at a great pressure; so that no inaction from choking, or injury to the barrel can take place in these patent pumps. These advantages render them invaluable for ships' use, mines, &c.

2. KNOWELDEN & EDWARDS'S PATENT DOUBLE-ACTION DIAPHRAGM PUMP, a modification in make of the above described pump. For use of brewers, distillers, chemical works, &c.

3. KNOWELDEN & EDWARDS'S PATENT STEAM PUMPING ENGINE.

4. KNOWELDEN & EDWARDS'S PATENT 10-HORSE STEAM ENGINE.

5. KNOWELDEN'S PATENT SAFETY VALVE.

[1902]

LAIRD, JOHN, SONS, & CO., *Birkenhead*.—A pair of 40-horse power horizontal direct acting engines

[1903]

LAMBERT, THOMAS, & SON, *Lambeth*.—Hydraulic press pumps; lift and force pumps; steam engine fittings in gun-metal. (*See page 36.*)

[1904]

LANSDALE, RICHARD, *Pendleton, Manchester*.—Patent compound rotary washing machine, with rollers for wringing or mangling. (*See page 37.*)

[1905]

LA ROCHE, PHILIP, 6 *Blacklands Terrace, King's Road, Chelsea*.—Improved beer engine; tapping cock, muller, and valves.

[1906]

LAWRENCE, H. M., & CO., *London Works, Sefton Street, Liverpool*.—Machine for making ice by steam. (*See page 40.*)

[1907]

LAWRENCE, JAMES, 5 *Formosa Terrace, Maida Hill, W.*—Patent refrigerator; mash-tun machinery; boiling and fermenting apparatus; plans and models.

LAWRENCE'S PATENT REFRIGERATOR, combining great cooling power, cheapness, and durability, with perfect cleanliness.

LAWRENCE'S PATENT REMOVABLE MASHING MACHINE, heat distributor, false bottom, sparger, &c.

LAWRENCE'S PATENT FERMENTING APPARATUS.

The above are in use at Burton-upon-Trent, and the chief towns of the United Kingdom; and also on the Continent and in the Colonies. Breweries erected and remodelled by contract.

[1908]

LEADBETTER, THOMAS, & CO., 13 *Gordon Street, Glasgow*.—Force pump; fire plug; hydraulic ram; water-closet.

[1909]

LEONI, S., *St. Paul's Street, N.*—Taps; steam cocks; machinery bearings; gas burners; ornamental wares of adamas, resisting heat, acids, wear, and friction.

[1910]

LILLIESHALL COMPANY, *Shiffnal, Shropshire*.—Pair of blast engines. (*See pages 38 and 39.*)

LAMBERT, THOMAS, & SON, *Lambeth*.—Hydraulic press pumps, lift and force pumps, steam engine fittings in gun metal.

HYDRAULIC PUMPS.

DEEP WELL PUMP.

LAMBERT'S PATENT REGULATING STEAM VALVE.

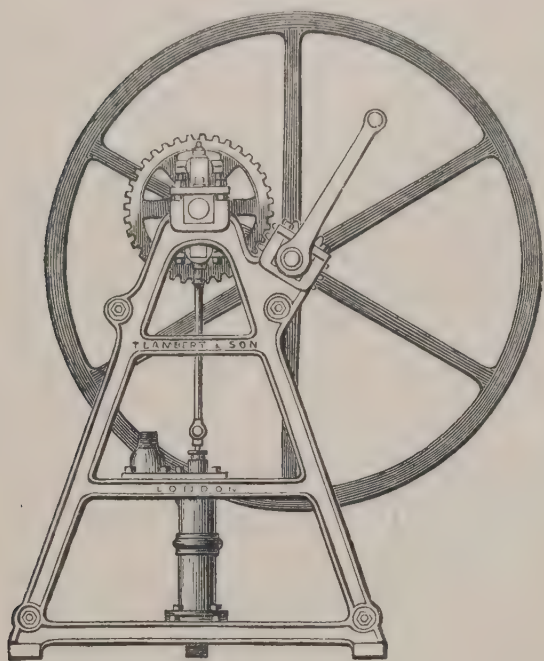
STEAM ENGINE FURNISHINGS, &c.

VAUCHER'S PATENT METAL BEARINGS.

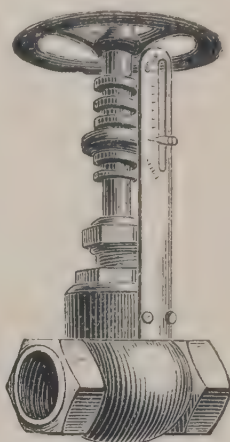
STAND POSTS, SLUICE VALVES.

FIXED PUMPS AND SAFETY VALVES.

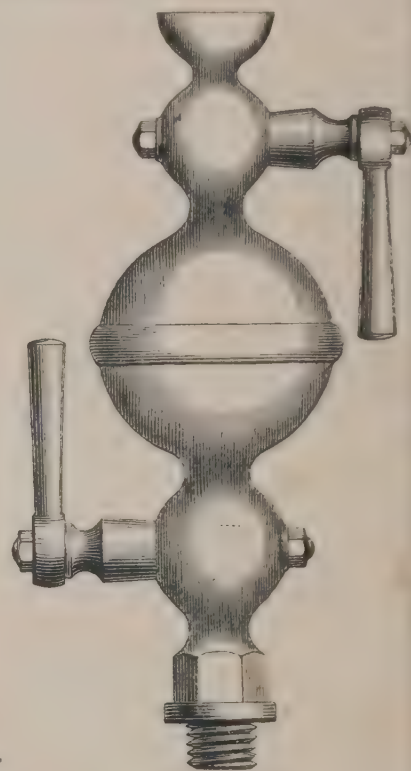
Society of Arts' Medal, 1847 ; Prize Medal, 1851 ; Bronze Medal, Amsterdam, 1854.



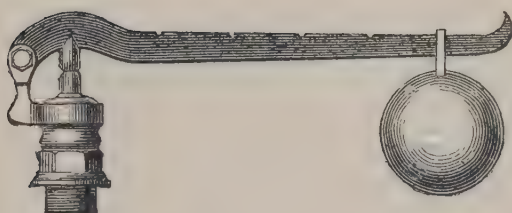
PUMP FIXED IN IRON FRAME, WITH WHEEL AND PINION TO DITTO.



LAMBERT'S PATENT REGULATING STEAM VALVE.



DOUBLE OIL COCK.

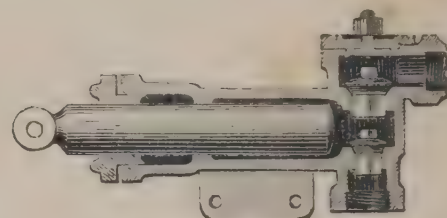


SAFETY VALVE FOR BOILERS.

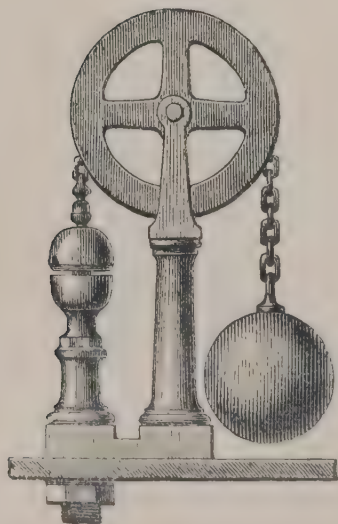


Draw-off Cock.

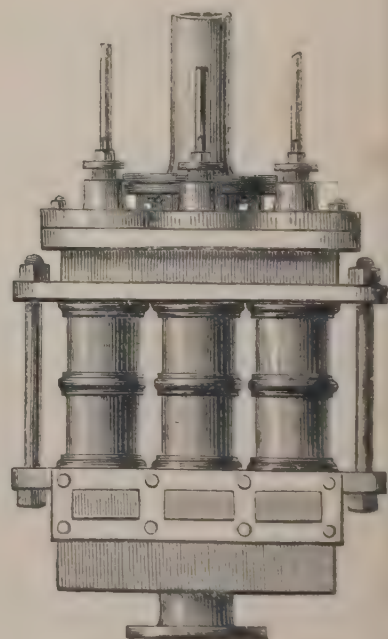
Screw for Fire Hose.



HORIZONTAL FEED PUMP.



ALARM WHISTLE WITH STANDARD, CHAIN, AND BALANCE WEIGHT.



TREBLE-BARREL DEEP WELL PUMP.

STREET OR YARD STAND-POST FOR FIRE OR ROAD-WATERING.

Illustrated Catalogues may be obtained, post free, on application.

LANSDALE, RICHARD, *Pendleton, Manchester.*—Patent compound rotary washing machine, with rollers for wringing or mangling.

This invention, by its compound action, easy working, and complete efficiency, having won the unqualified praise of many eminent machinists, and approved itself to all purchasers unexceptionally, the patentee submits it to the public, assured that wherever its construction is understood, its merits will be admitted.

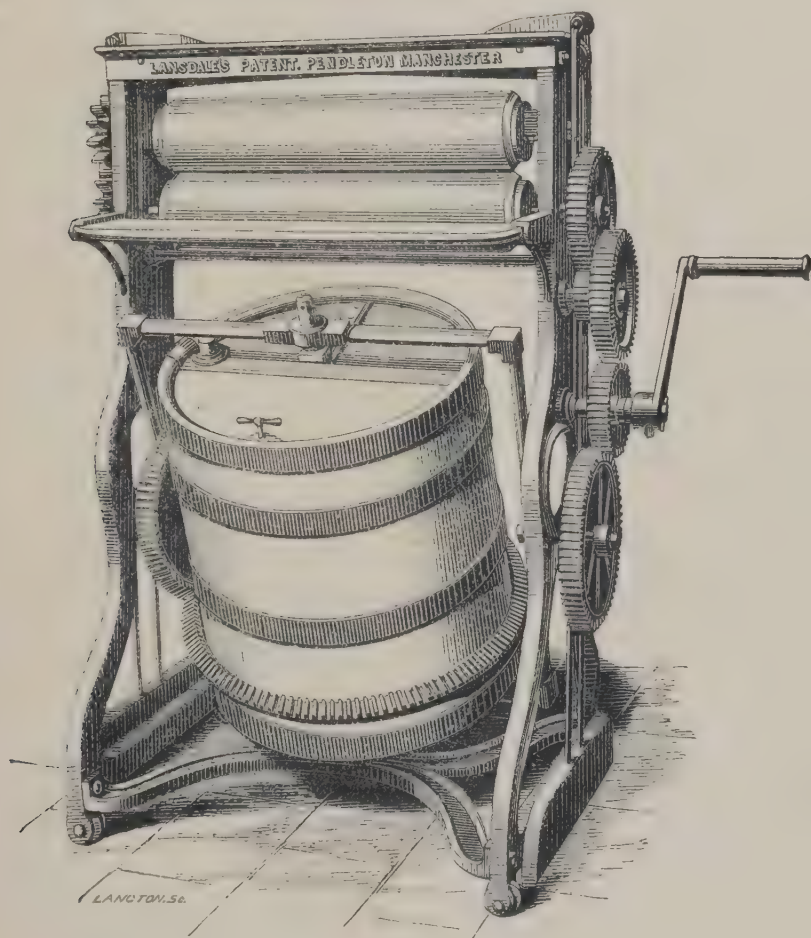
A barrel of 30 gallons' capacity is hung upon 4 centres, mechanically arranged to produce (without the least complication) a compound rotary motion, so that by the turning of a handle, the barrel containing the articles to be washed, revolves two ways—horizontally and vertically—at the same time. By this double movement the contents of the barrel are thoroughly agitated, and a washing process attained, upon a compound dash-wheel principle.

Over the inner surface of the wash-tub short wooden cones are studded about 6 in. asunder, which, when the machine is in motion, alternately rub the clothes and dash them through the water, repeating this operation

with each revolution of the barrel, as the mechanical consequence of its compound rotation.

For easy working this machine is unsurpassed; its excellence in this particular being proved by one significant fact, viz. that much less power will turn the barrel when containing 20 gallons of water, than when containing only 2; strength equal only to that of a child is enough for working it. Combining, then, this vast advantage of light labour with the perfect cleansing treatment the clothes receive, in consequence of the peculiar mechanical action of the wash-tub, we have a result establishing beyond question the complete efficiency of the invention.

A five minutes' trial will fully demonstrate the general convenience of this machine. It simplifies washing, reducing it from an affair of skilled labour, to the trifling process of turning a handle. It is portable—the push of a hand or foot sufficing to wheel it about. The working parts are strong, simple, and cannot disarrange themselves; whilst of its compactness the best estimate may be formed by examining the following engraving.



WASHING MACHINE.

This machine having been designed expressly to meet every requirement of a well-appointed family laundry, the patentee requests a careful notice of its general arrangement. With a wash-tub of 30 gallons' capacity, are combined thick well-seasoned sycamore rollers, for wringing or mangling; which are so adapted that, without the use of any dripping boards, all drainage falls back into the open tub. To the rollers are affixed self-regulating weighted levers, which adjust themselves to every article passing through them, of whatever texture—thick or thin—with perfect nicety, and with a pressure such as greatly hastens the subsequent drying.

One other great convenience merits notice. By the simplest contrivance, both mangling and washing are

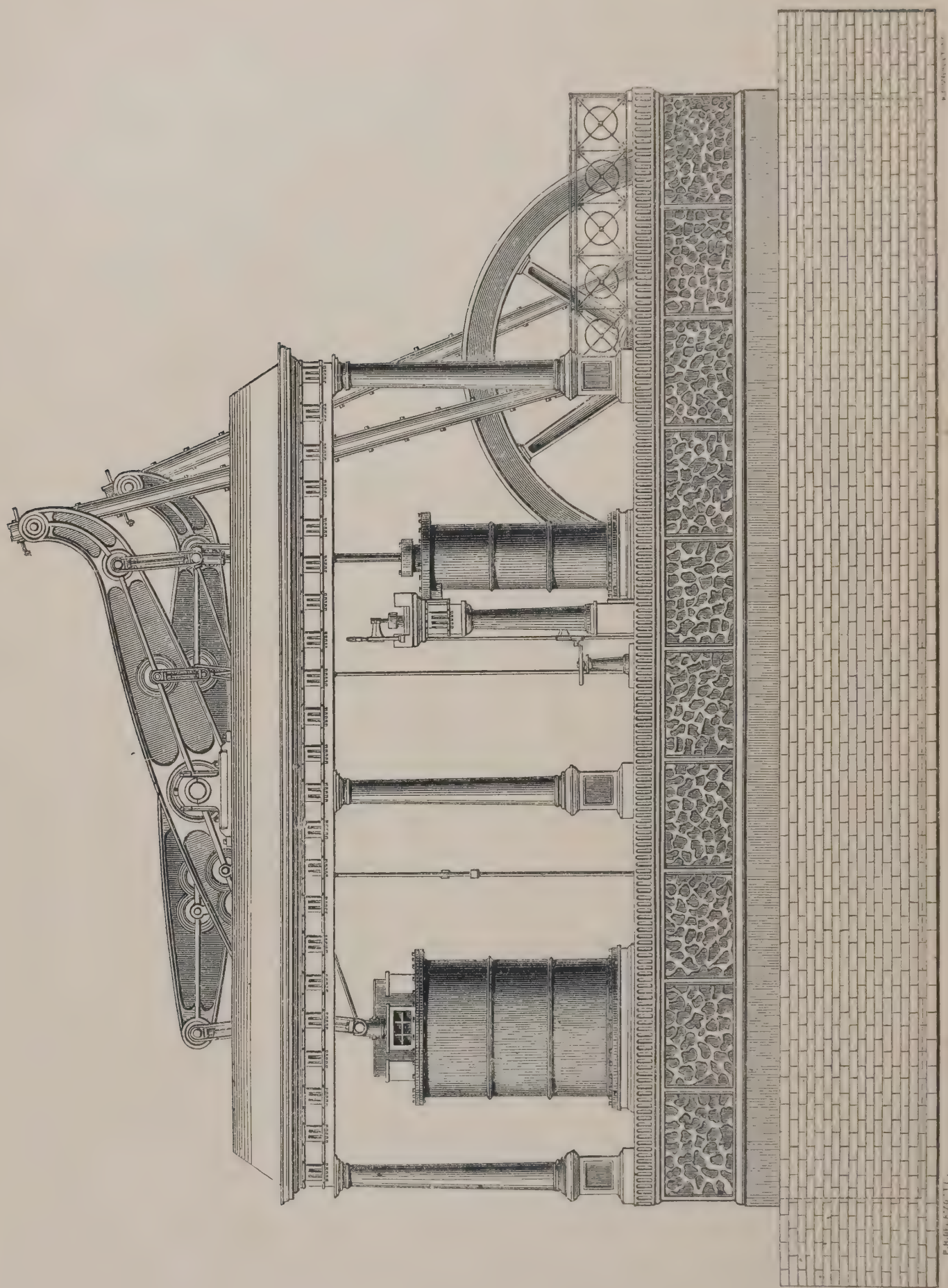
worked with but one handle, which can be instantly adapted to either purpose. For well-combined working parts in little space, this machine will satisfy the most fastidious. Extreme measurement, 36 by 50 in.

Price £9 9

INSTRUCTIONS FOR WASHING.

Chip 1 pound of soap into 3 quarts of water, and boil into a ley. Half-fill the wash-tub with clothes and water, adding soap ley at discretion, and give each lot of clothes about a 4 minutes' wash. Next boil such articles as need it, and work them once again for 4 minutes, as a finish. Always, before the tub is turned, take care to screw the lid down tightly.

LILLESHALL COMPANY, *Shiffnal, Shropshire*.—Pair of blast engines.



PAIR OF BLOWING ENGINES.

The small pair of BLOWING ENGINES sent for exhibition by the Lilleshall Company, are self-supporting, and fixed upon wrought-iron foundation, &c. for the convenience of exhibition. They are capable of blowing 2 cold-blast furnaces, are arranged to work together or separately with great economy, and are most simply and substantially built. A pair of large engines may be seen at the Works, of the same design, but fixed

in a house, the beams resting upon a transverse entablature, supported by 4 massive columns; blowing 5 cold-blast furnaces.

The Company are manufacturers of all kinds of high-pressure expansive and condensing steam engines, and colliery and contractor's locomotives, especially adapted for heavy gradients and sharp curves, fitted with the Lilleshall Company's patent compensating buffers, which adjust

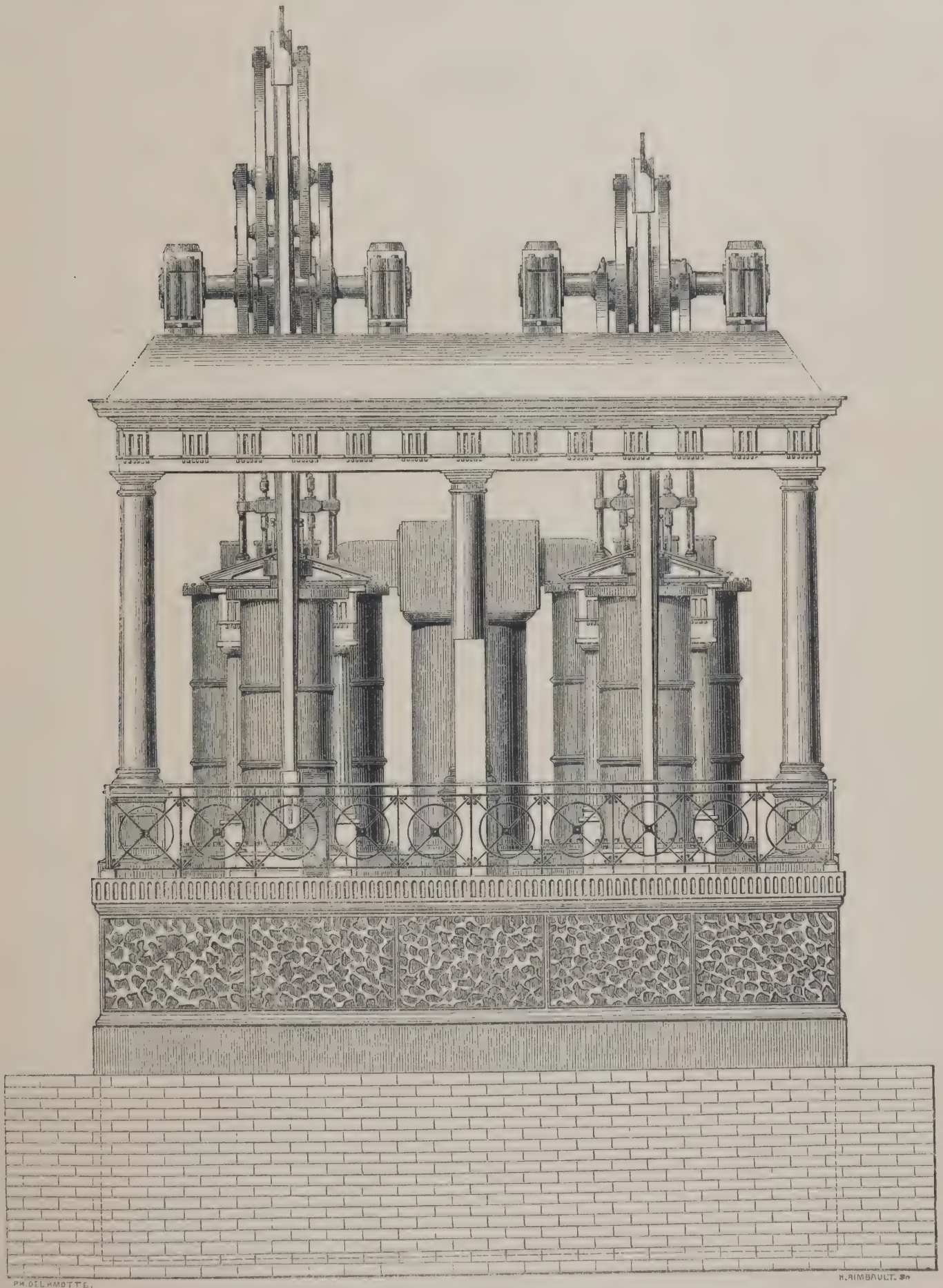
LILLESHALL COMPANY, *continued.*

themselves to any angle, each buffer taking equal strain ; and also Gifford's injector, most important improvements in this class of engine.

Blast engines fitted with 4 double-beat valves and expansive valve gear, working direct, of simple and

durable construction (all the gearing and principal wearing parts being of hardened steel).

This Company also manufactures PUMPING ENGINES of all descriptions, acting direct or through a beam, working with high-pressure steam, cut off at any part of the



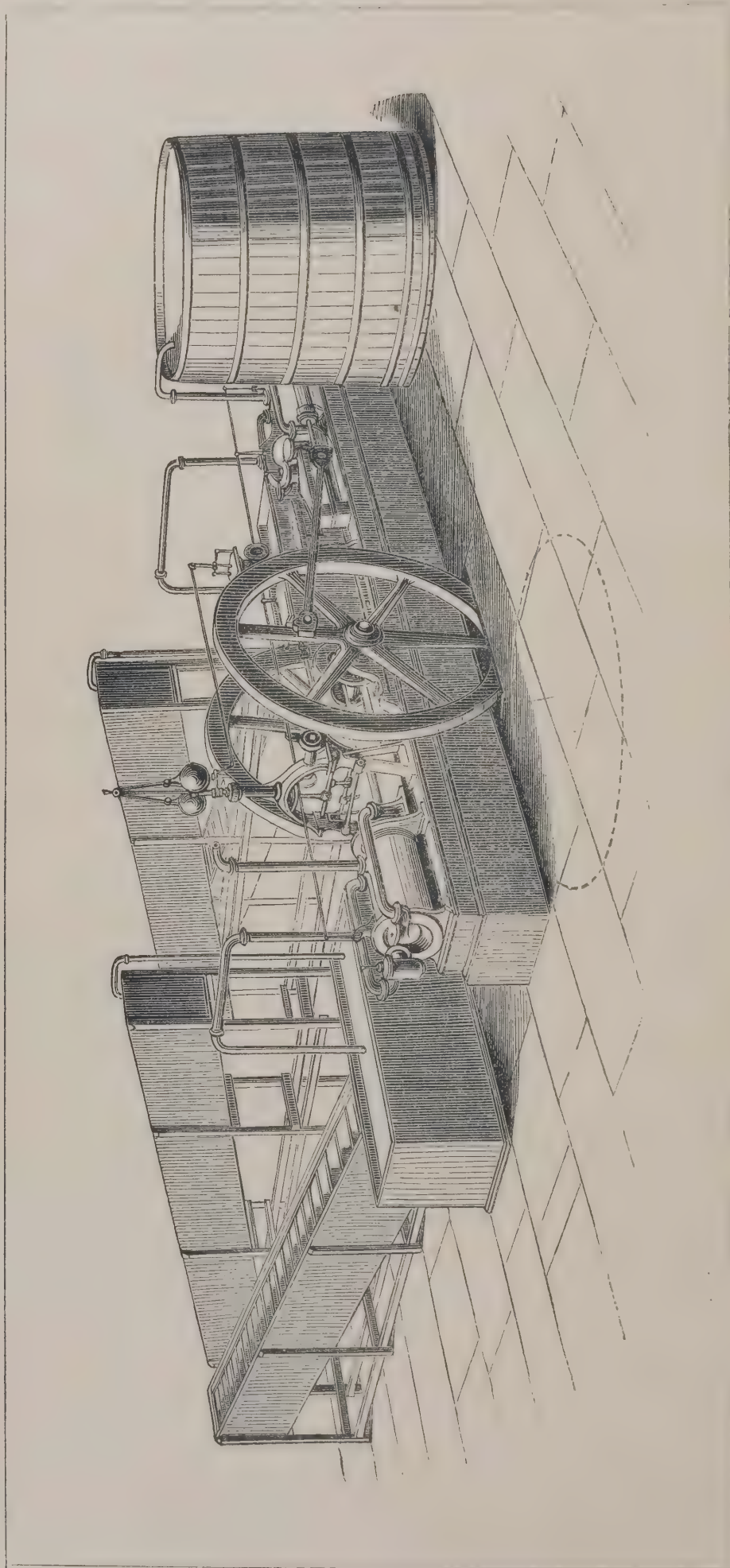
END ELEVATION OF BLOWING ENGINES.

stroke ; condensing winding engines, horizontal, vertical, direct or beam, coupled or single, fitted with a new improved link motion (which gives the engine-man more perfect control) ; strong and massive steam-engines for rolling mills, sugar mills, saw mills ; chilled and grain

rolls ; guides and other castings, where strength and durability is a desideratum. All these goods made from the Lilleshall cold-blast iron.

See specimens of coals, and argillaceous ironstones, from which their cold blast pigs are made, Class 1.

LAWRENCE, H. M., & Co., *Sandon Works, Sefton Street, Liverpool.*—Machine for making ice by steam.



MAKING ICE BY STEAM. MESSRS. H. M. LAWRENCE & CO. LIVERPOOL.

The exhibitors are the makers of the patent SEMAPHORE TARGET, which obviates the necessity for mantelet and marker :
the hits being indicated at once by the rise and fall of signals.

[1911]

LINDSAY, ROBERT BAIRD, *Laurel Bank, Paisley*.—Model to exhibit patent method of removing incrustations from marine and locomotive boilers.

[1912]

LLOYD & LLOYD, *Albion Tube Works, Birmingham*.—Wrought-iron tubes and fittings for gas, steam, water, &c.

Wrought-iron fittings in tees, elbows, crosses, &c.
Conducting pieces, various, all forged on the anvil.
Iron main cocks.
Taps, stocks, and dies for screwing.
Locomotive and other boiler-fittings in brass and gun metal.
Water gauges, whistles, &c.
Solid bottom stuffing box, gland steam cocks from $\frac{1}{4}$ in. bore upwards.

Patent lapwelded iron tubes, for locomotive, marine, and stationary boilers.

Wrought-iron butt-welded tubes, screwed and socketed, from $\frac{1}{8}$ in. bore upwards.

Specimen of improved homogeneous metal tube, flattened and turned up at the ends, to show its perfect malleability.

[1913]

LLOYD, GEORGE, 70 *Great Guildford Street, Southwark*.—Patent noiseless centrifugal fan blowing machines, mine ventilators, &c.

Obtained the prize medal at the Great Exhibition, 1851; also the silver medal at the Paris Exhibition, 1855.

For melting iron and other metals; blowing smiths' forges; puddling furnaces; dessication; ventilating buildings, ships, sewers, wells, coalpits, and mines of every description; and forcing or exhausting hot or cold air at high or low pressure, for any purpose for which it may be required.

The machine exhibited (42-in.) will melt from 4 to 5 tons of iron per hour, or blow from 60 to 80 smiths'

forges; or will deliver, for ventilation, 7,500 cubic feet of air per minute.

From the peculiar construction of this fan, it will do nearly double the amount of duty with the same amount of power as any other kind of fan, and from there being no back action on the blades by the air, it works entirely without humming noise.

Sizes made:—13, 16, 19, 22, 25, 30, 36, 42, 48 inches.

[1914]

LOUCH, JOHN, & Co., 69 *Fenchurch Street*.—Union joints and pipe fittings.

[1915]

LUMLEY & WATSON, 50 *Lower Shadwell, E.*—Steam crane, iron blocks, and crab winch.

[1916]

MCCALLUM, DAVID, 1 *Octagon, Plymouth*.—Electro-magnetic engine.

[1917]

McFARLANE, WILLIAM, 39 *Stockwell Street, Glasgow*.—Patent cylinder mangle, washing and wringing machines.

[1918]

MCGLASHAN & Co., *Drury Lane, W.C.*—Beer cooler.

[1919]

MCGLASHAN & MERRYWEATHER, *Coal Yard, Drury Lane*.—Steam cocks; boiler fittings; plumbers' brass work; pumps; model refrigerator.

[1920]

MACINTOSH, CHARLES, & Co., *Cannon Street, London; and Cambridge Street, Manchester*.—Mechanical appliances of vulcanized rubber.

[1921]

McONIE, W., & A., *Scotland Street Engineer Works, Glasgow*.—30-horse power steam engine and sugar mill, with cane and megass carriers. (*See page 43.*)

[1922]

MACORD, R. H., 63 *Lower Thames Street*.—Machines, tools, and utensils used for bottling wine, spirits, beer, &c. (*See page 44.*)

[1923]

MANCHESTER WATER METER COMPANY, THE, *Tipping Street, Ardwick, Manchester*.—Water meters for general and trade purposes, steam boilers, &c. (*See page 45.*)

[1924]

MANLOVE, ALLIOTT, & Co., *Blooms Grove Works, Nottingham*.—Engines, centrifugal sugar machines, washing and drying machinery.

PATENT CENTRIFUGAL SUGAR MACHINE, under driven, full operation.

PATENT CENTRIFUGAL SUGAR MACHINE, top driven, full operation.

PAIR DIRECT-ACTING STEAM ENGINES, for driving centrifugal sugar machines.

PATENT HAND-DRIVEN HYDRO EXTRACTOR, or wringing machine.

MODELS.

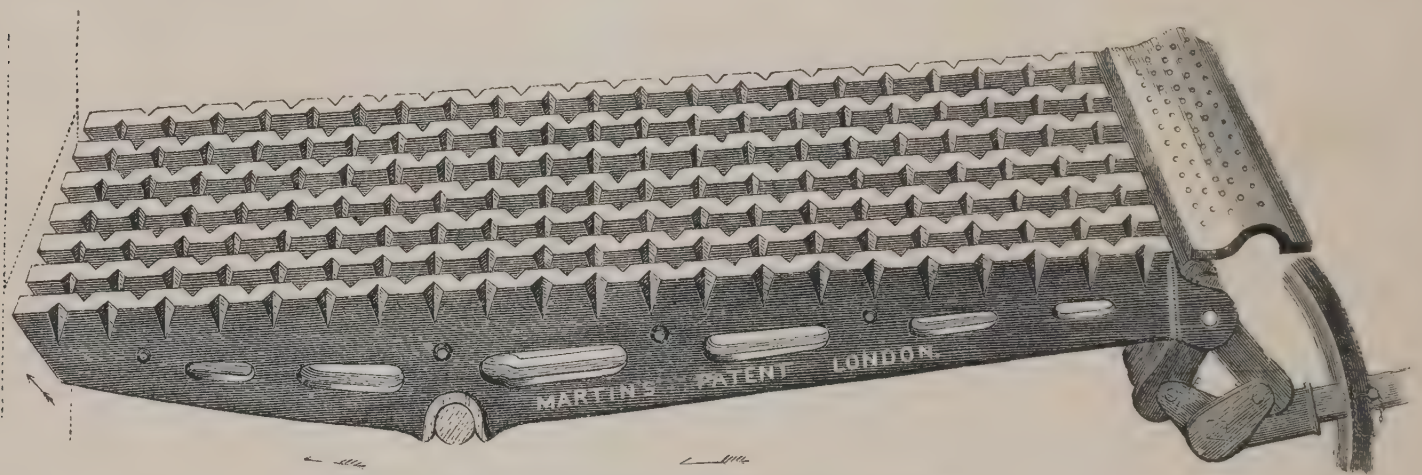
Patent improved washing machine, horizontal engine.

Patent hydro extractors with counter gearing.

Drawings of engines and centrifugal machinery.

[1925]

MARTIN, W. A., 55 *Great Sutton Street, E.C.*—Patent rocking furnace bars for land and marine purposes.



MARTIN'S PATENT ROCKING FURNACE BARS.

This invention is of great importance to mill owners, steam navigation companies, and all firms using steam power. The durability of the patent bars is extraordinary; they have surpassed every fire bar yet tried, being constructed on scientific principles, to insure strength and burning powers, and having been most rigorously tested. They are now standing the fiercest fires, under service, night and day, and are not in the least affected; the full effect of the furnace is maintained, and the highest steaming powers are produced. The fires are easily managed and effect a large saving in fuel and labour; the lever, with one touch, moves the bars, every one acting as a poker,

instantly clears all the furnace, and removes clinkers, and all impurities.

The sea service bars, from their simplicity and efficiency, will be found most valuable to ocean steam ships. They do away with the laborious work in the stoke-hole; they cannot get foul or knocked out of their place; and with the dirtiest description of fuel, they will clean themselves, and maintain regular steam, and high speed.

References to large firms now adopting them and particulars, may be obtained by applying to the patentee.

Agents, Lankester & Son, Ironfounders, Southampton; Alston & Gourlay, British Iron Works, Glasgow.

[1926]

MAUDSLEY, SONS, & FIELD, *Lambeth*.—Marine engine.

[1927]

MAY, WALTER, & Co., *Birmingham*.—Double-cylinder steam engine and surface condenser: portable corn mill. (*See page 46.*)

[1928]

MERRYWEATHER & SON, 63 *Long Acre, London*.—Fire engines, hose, &c. (*See pages 48, 49.*)

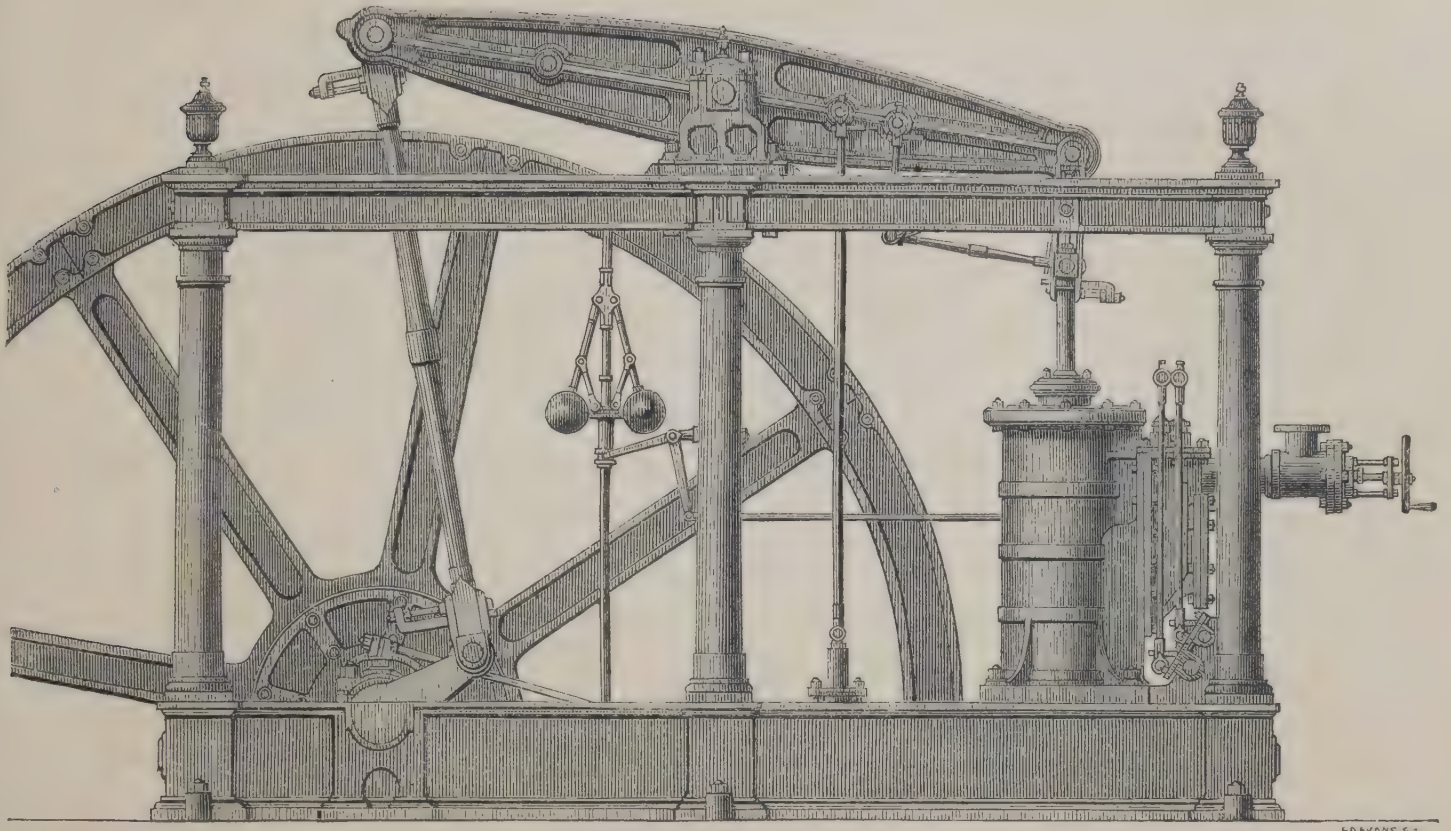
[1929]

MICKELTHWATE, ARTHUR, *Sheffield*.—Patent metallic, hemp, and leather belting; metallic and leather boot and shoe soles.

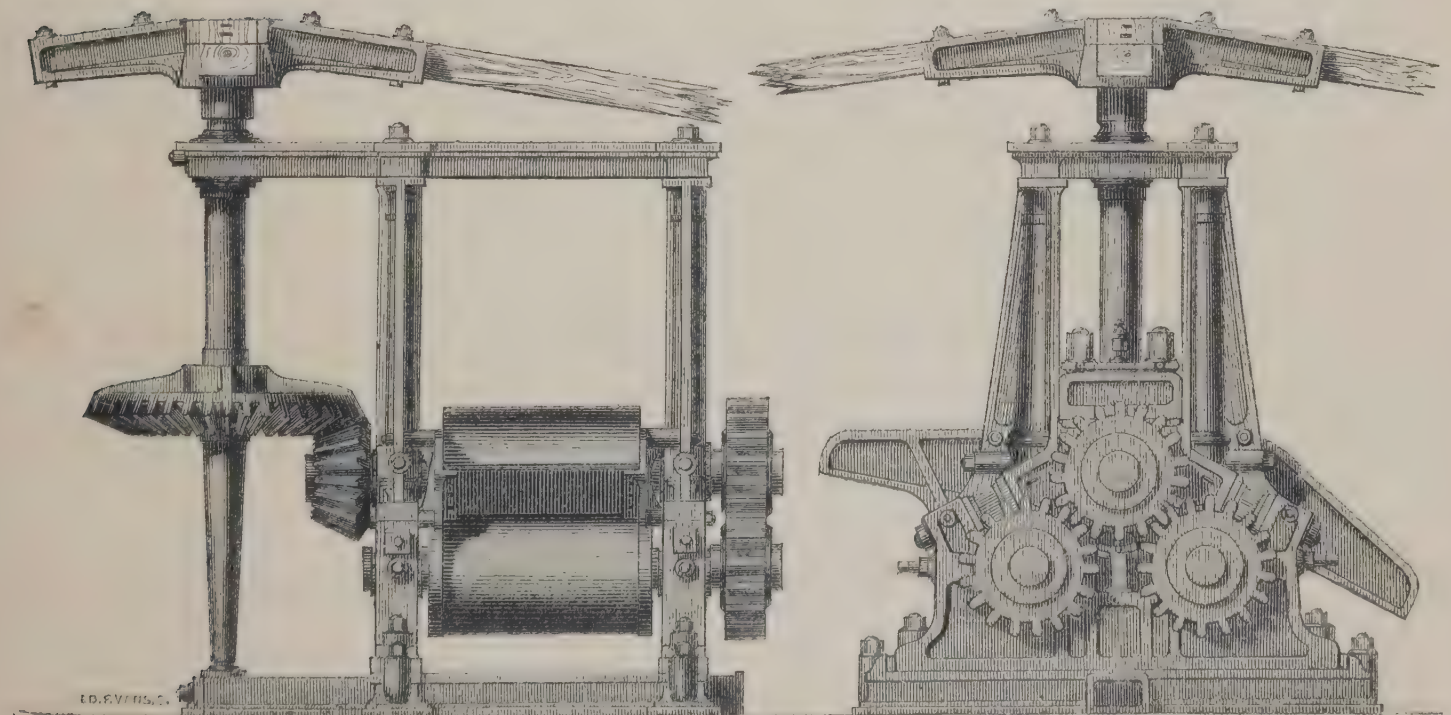
[1930]

MIDDLETON, THOMAS, *Loman Street, Southwark*.—Murray's patent chain pump for sewerage drainage, or irrigation.

McONIE, W. & A., *Scotland Street Engineer Works, Glasgow.*—30-horse power steam engine and sugar mill.



THIRTY-HORSE POWER HIGH-PRESSURE STEAM ENGINE.

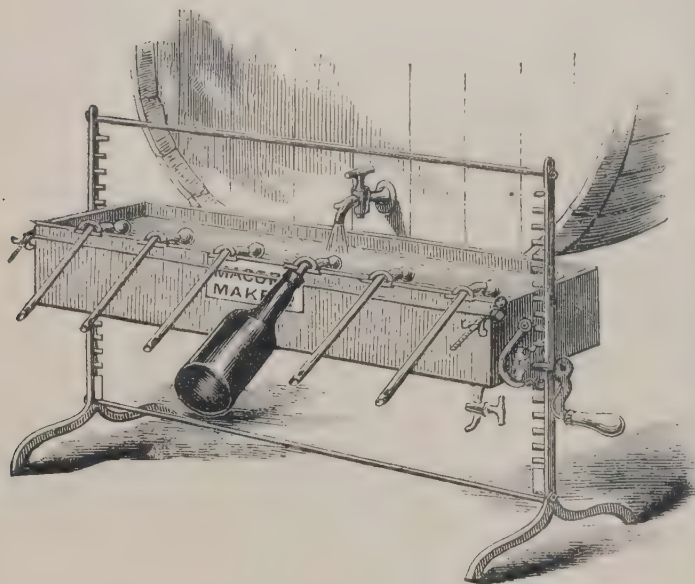


SUGAR-CANE MILL FOR WORKING BY CATTLE.

A HIGH-PRESSURE STEAM ENGINE AND SUGAR-CANE
MILL.

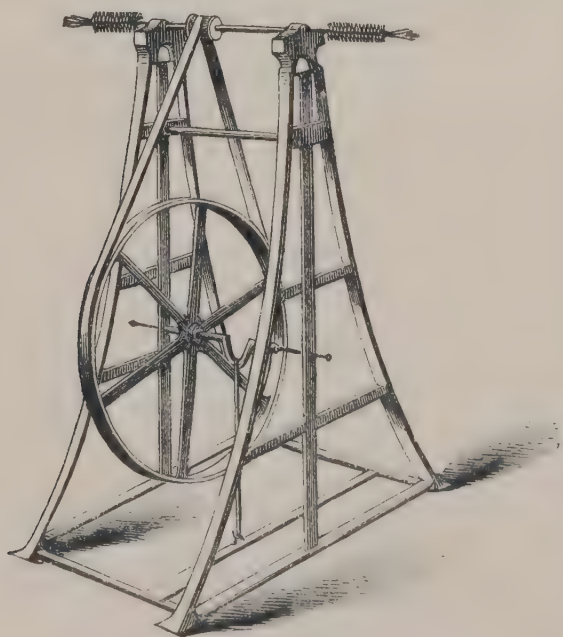
A SMALL SUGAR-CANE MILL, to be worked by cattle.

MACORD, R. H., 63 *Lower Thames Street*.—Machines, tools, and utensils used for bottling wine, spirits, beer, &c.



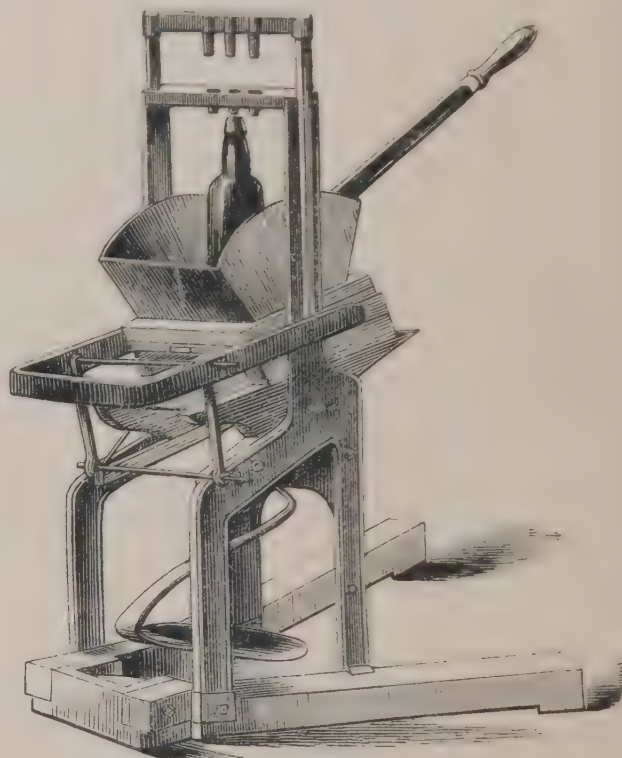
MACORD'S IMPROVED PATENT BOTTLING APPARATUS.

This apparatus is far superior to the original "Master-man's Patent," and is the best in use. Its advantages are—1st: That being made entirely of metals, it is much more durable, and less likely to get out of order. 2dly: The cistern has two pinions, connected by a shaft, and two slides fixed to it, which are worked in the racks on the upright iron pillars by means of a lever handle, and thus raised or lowered with perfect ease, being kept level all the time (a great recommendation). It is also fitted with a tap at bottom, by means of which it may be thoroughly cleaned without removing. The syphons are fitted to the cistern with hinge joints; and, one pin forming the centre for all, they may be removed and replaced without any unscrewing or screwing; they are also made so that one set will answer both for pint and quart bottles.



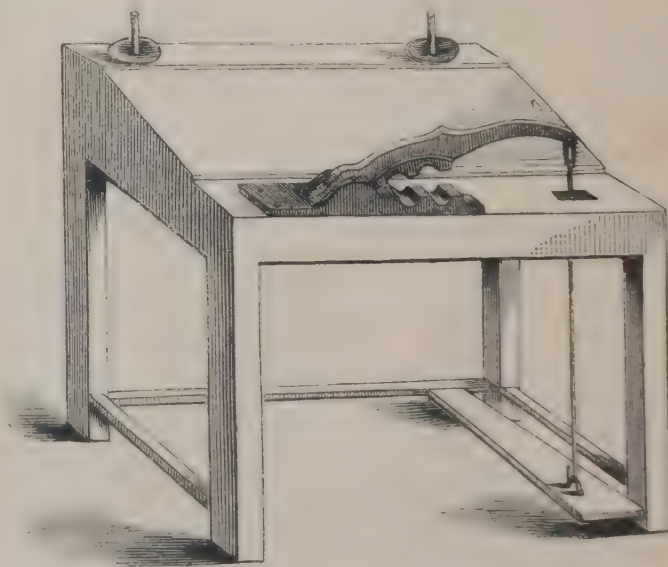
MACORD'S BOTTLE-WASHING MACHINE.

This machine having been extensively used in the trade, is recommended with confidence as the best and quickest mode of cleaning bottles; it is simple, portable, and effective thoroughly cleaning all bottles without the aid of soot or grit; it requires no fixing, and is very durable.



IMPROVED PATENT CORKING MACHINE.

The principle of this corking machine is, to force the cork into the bottle through a conical tube in contact with its mouth in such a position, as to form one continuous tube with its neck, and having the lower orifice so small, that the cork must be considerably compressed and compacted in passing through it. As the corks are impelled into the bottles by a lever, it must be evident, from the above principle, that all jarring against or even pressure on the bottles is avoided; the consequence, as experience has proved, is that no breakage takes place, provided the bottles be sound, and mere ordinary care be taken. Another advantage is, that the bottles can be much tighter corked than by the common method; so much so as to preclude the necessity of wiring them. The machine is portable, and constructed principally of iron.



MACORD'S CORKING MACHINE.

This form of machine is in general use throughout the bottling trade; it is used with a leathern boot strapped on to the knee; and the bottle being held therein, the cork, after being sufficiently compressed by the machine, is driven into the bottle with a hard-wood driver.

MANCHESTER WATER METER COMPANY, THE (Limited), *Tipping Street, Ardwick, Manchester.*

Water meters for general and trade purposes, for steam boilers, works, warehouses, shops, offices, &c.

METER FOR GENERAL AND TRADE PURPOSES (see wood engraving).

These meters are constructed on the piston and cylinder principle, the piston having a reciprocating action. Their chief novelty consists in the use of a compound fluid motive valve to reverse the stroke of the piston, and change the direction of the effluent water; which object it effects, without concussion or stoppage in the flow. This has never before been accomplished in any high-pressure water meter with a single cylinder and piston, without the aid of springs or tumbling weights. The exterior of these meters consists of a strong case of cast-iron in three parts, bolted together. The lower portion forms the measuring cylinder, and is lined with brass, which is smoothly bored out. In this cylinder the piston works: it is packed with cupped leathers, similar to those used in hydraulic presses. The upper portion of the meter contains the compound valve and the wheelwork of the index. All the working parts are made of brass, and are therefore not liable to be affected by water. These meters have been practically and thoroughly tested for upwards of three years, and a large number of them are now used by water companies and others. They require no lubrication, and in accuracy and durability, they have far surpassed all other meters.

NEW PATENT STEAM-BOILER METER.

A meter to measure the water evaporated by steam boilers has long been a desideratum; but the necessity of using leather, india-rubber, and other flexible substances in packing the pistons of all positive measuring meters, has hitherto been the great difficulty. This difficulty has now been successfully removed in the Company's new boiler meter, which is constructed entirely of metal, on a principle that involves the smallest possible liability to become deranged, and that secures accuracy and efficiency in working. It is portable and convenient in form, and can easily and readily be attached and detached.

This meter can be placed at any distance from the boiler, or between the boiler and the pump. Its use will ensure the most accurate and reliable test of the best construction of boilers, fire-bars, and furnaces; and of the various kinds of steam economizers. It will also secure perfect tests of all descriptions of coal and other fuel, and of the work done by steam engines in proportion to the coal or other fuel consumed.

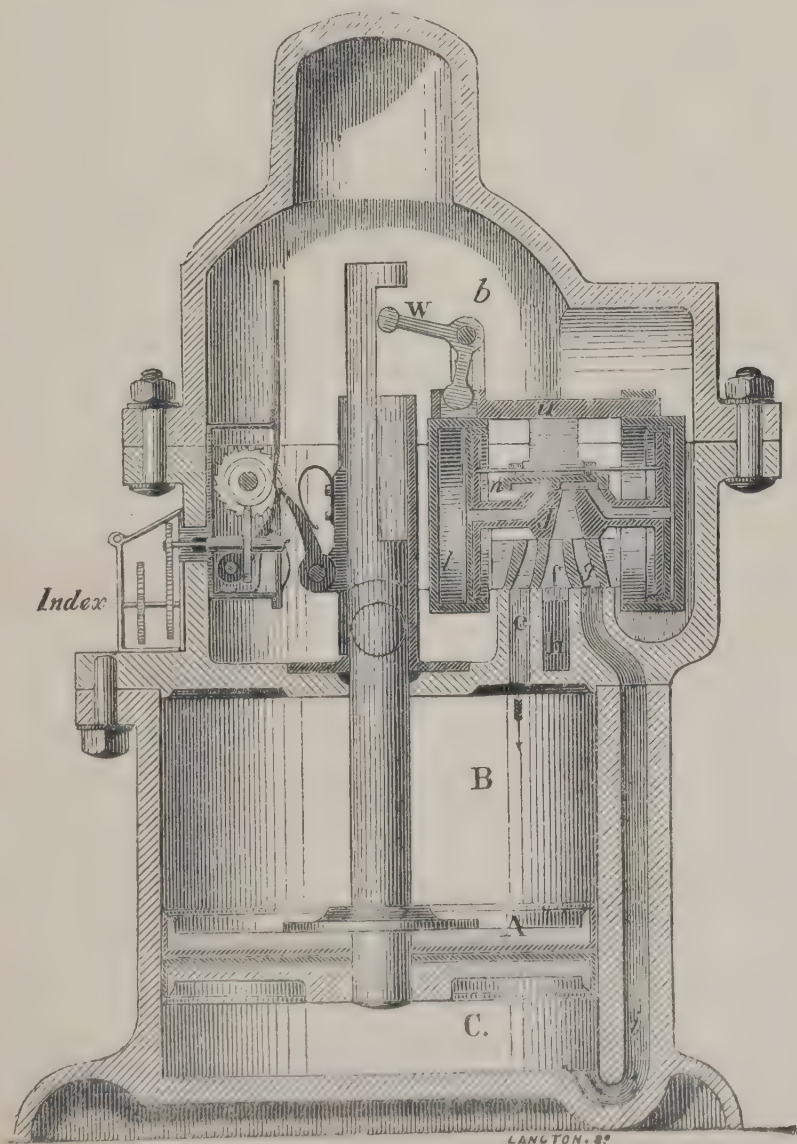
NEW PATENT OFFICE AND DOMESTIC METER.

The attention of water companies & the public generally is directed to the new water meter for private dwelling houses, offices, warehouses, shops, public houses, &c. The size of this meter is small, and the price is moderate. To water companies, who desire to economize their water by preventing waste, and to deal equally towards all their customers, this meter will prove of inestimable use; while to small consumers, for baths, stables, water closets, fountains, &c. it will afford the means of guaranteeing a supply of water at a fixed rate per 1,000 gallons, and remove any sense of injustice which may

now be unavoidably experienced, in consequence of the charges for water being arbitrarily fixed, without any reference to the quantity used.

Water has hitherto been generally charged at a rate higher per 1,000 cubic feet than gas; but now that water meters can be had capable of measuring water as accurately as gas is measured, there is no longer any necessity to fix the charges for any class of consumers of water otherwise than by meter.

For further particulars, apply to the Manchester Water Meter Company, Limited, Tipping Street, Ardwick, Manchester.



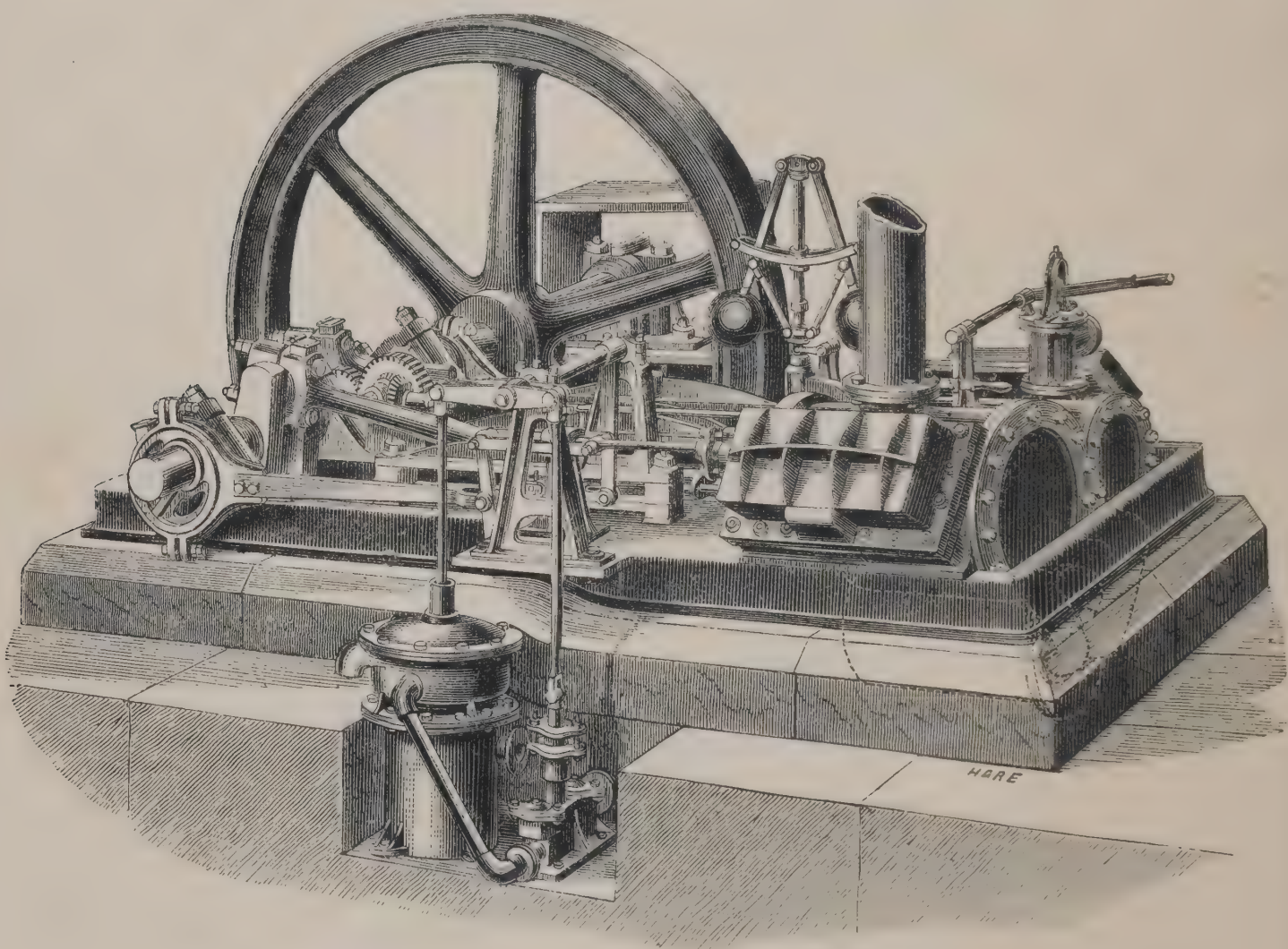
WATER METER FOR GENERAL AND TRADE PURPOSES.

MAY, WALTER, & Co., *Suffolk Works, Berkeley Street, Broad Street, Birmingham.*—An uniform power double-cylinder horizontal steam engine.

This engine is designed especially with a view to obtain uniform rotative power, and at the same time to carry the expansion of the steam to a great extent, for the purpose of ensuring the utmost amount of economy in fuel.

The cylinders are respectively 10 and 21 in. diameter, and the length of stroke is 2 ft. in each case; one external steam jacket, fed direct from the boiler, embraces both cylinders. The steam enters the small cylinder at the full pressure of the boiler, and when the piston has travelled half its stroke, is cut off and expanded through the remainder of the stroke. It is then exhausted into the

wrought-iron reservoir, shown by dotted lines under the bedplate, this reservoir being jacketed with high-pressure steam from the boiler. Here the steam is stored up until the crank of the larger cylinder, which is at right-angles to that of the smaller one, has brought its piston to the end of the stroke, when the slide valve of the large cylinder opens and admits the steam from the above mentioned reservoir, and, as in the smaller cylinder, it is again cut off at half stroke, expanded through the remainder of the stroke, and exhausted into the condenser, which may either be a surface condenser, as in the case of the engine



W. MAY AND CO.'S DOUBLE-CYLINDER HORIZONTAL ENGINE.

exhibited, or an ordinary one, according to the circumstances of each particular case. The air pump, which is placed vertically, as being preferable to horizontally, is worked by a connecting rod from the end of the crosshead of the large cylinder.

The nearest approach that it is possible to obtain to perfectly uniform rotative power is arrived at by constructing from calculation, the indicator figure, that would be produced by each cylinder, and deducing therefrom the requisite proportions that should exist between their two diameters, and the points at which the steam should be cut off, in each respectively.

In connexion with the above described engine, is exhibited PERKIN'S PATENT SURFACE EVAPORATOR CONDENSER; the advantages of which may be summed up as follows, viz:—The supply of perfectly pure water to the boiler, which infallibly prevents all incrustation and priming. The more regular supply of water to the boiler. The condensers are cheap and very portable. Dirty or salt water is capable of being used for condensation; and existing high-pressure engines, may, by its use be converted at a moderate cost into condensing engines, and a very considerable increase of power obtained, without any additional consumption of fuel.

[1931]

MILLER & PIERCE, *Glasgow*.—Fire pump for ships.

[1932]

MIRPLEES & TAIT, *Glasgow*.—Steam engine and sugar mill in motion.

[1933]

MONCTON, E. H. C., *Wansford*.—Model of a steam generator.

[1934]

MOORE, EDWIN, *Depôt, 55 Upper Marylebone Street, W.*—Pressure gauge; all kinds of steam fittings.

[1935]

MORGAN, J. & Co., *Stafford Street, Birmingham*.—Block-cutting machine.

[1936]

MORRISON, R. & Co., *Newcastle-on-Tyne*.—High-pressure surface condensing expansive marine engine, cut-off variable. (*See page 50.*)

[1937]

MURRAY, E., & COMPANY, 2 *Walbrook Buildings, City, London*.—Patent moving argand fire bars, patent metallic lubricant.

[1938]

NAPIER, D., & SON, 5 *Vine Street, & 51 York Road, Lambeth*.—Centrifugal machine for curing sugar; automaton mint weighing machine.

[1939]

NAPIER, ROBERT, & SONS, *Glasgow*.—Drawings of marine engines.

[1940]

NEAL, THOMAS, 45 *St. John Street, Smithfield*.—Patent grinding mills, for flour, ink, drugs, &c.

[1941]

NEEDHAM, JOHN, *School Brow, Warrington*.—Direct-acting horizontal steam engine, with adjustable eccentric for regulating valve.

[1942]

NEEDHAM & KITE, *Phœnix Iron Works, Vauxhall*.—Filter for semi-fluids. (*See page 51.*)

[1943]

NEILL, E. B., 11 *Parliament Street, W.C.*—Ericson's caloric air engine, 2-horse power, no boiler, most safe and simple.

[1944]

NEWTON, KEATES, & Co., *Liverpool*.—Copper and brass articles for engineers, &c.

[1945]

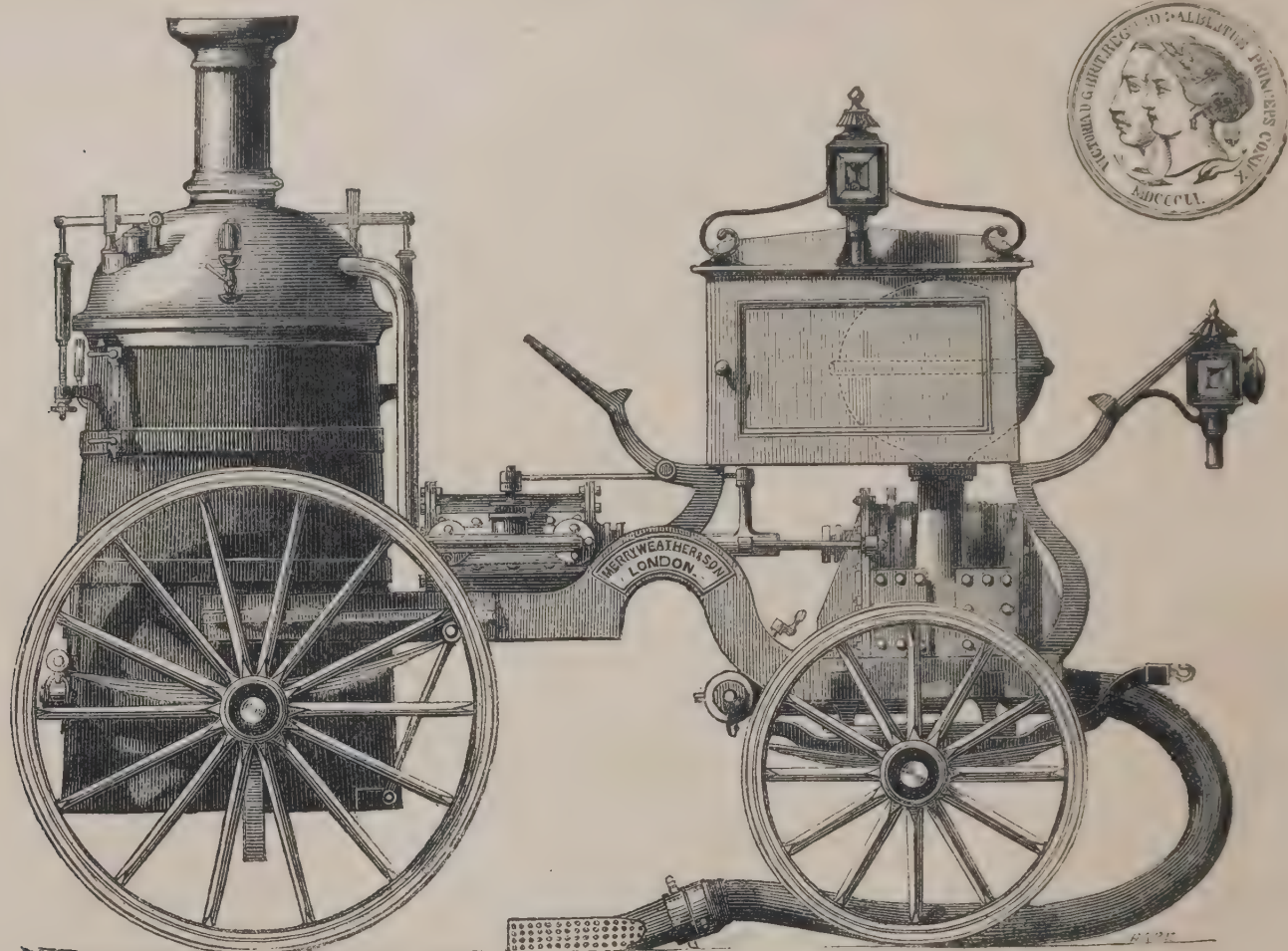
NOBES & HUNTER, 16 *St. Andrew's Road, Borough, London*.—Leather for engineering and mechanical purposes, machine bands, hose, and buckets.

<p>The exhibitors are curriers, and manufacturers of improved single and double leather bands for driving all kinds of machinery, copper-riveted leather and india-rubber hose-pipes for fire engines, steam and other pur-</p>	<p>poses; leather fire buckets and leather for railways, engineering, mechanical, and ships' purposes; improved suction-hose, &c.</p>
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[1946]

NORMANDY, D. A., & Co., *London*.—Apparatus for obtaining aerated fresh water from sea water.

MERRYWEATHER & SON, 63, *Long Acre, London.*—Fire engines, hose, buckets, fire escapes, &c.

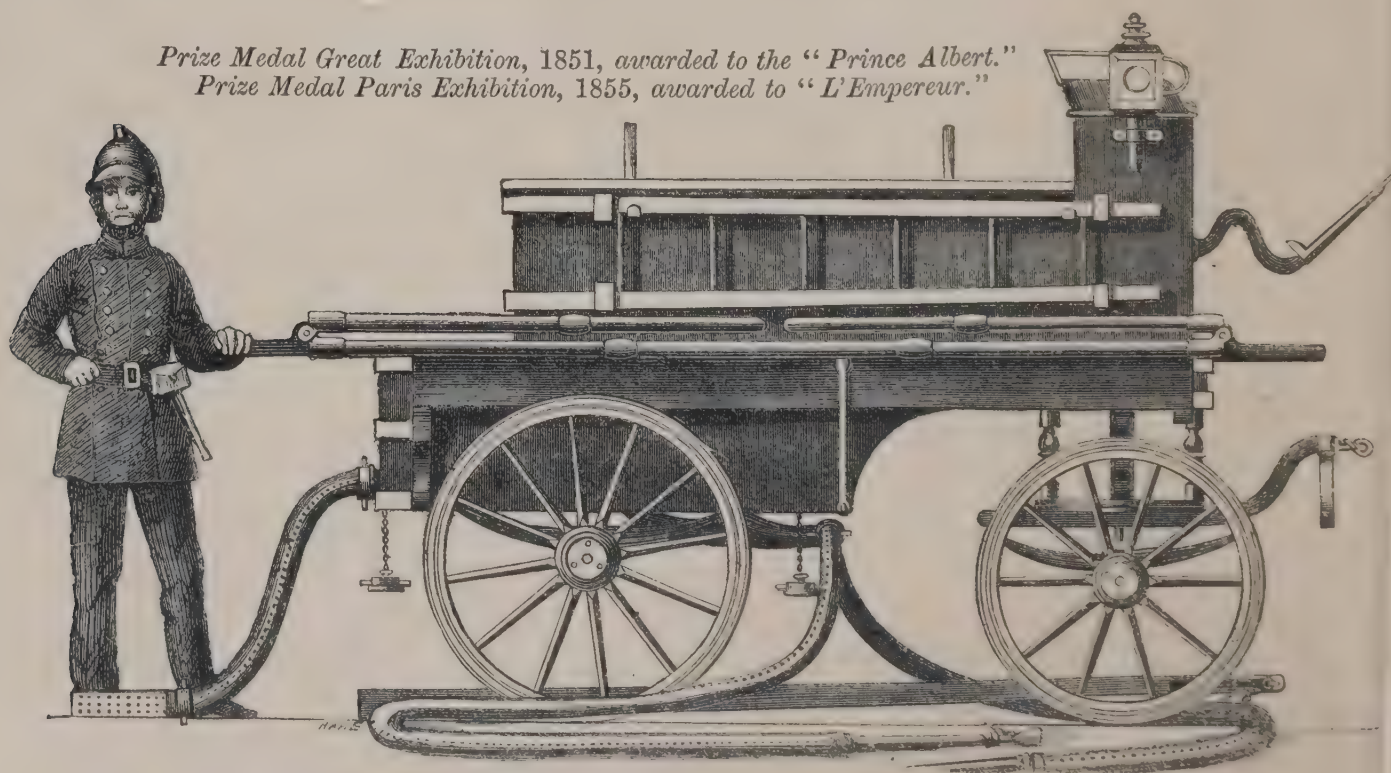


MERRYWEATHER AND SON'S PATENT STEAM FIRE ENGINE.

MERRYWEATHER & SON'S PATENT STEAM FIRE ENGINE, for service in any climate, is light, powerful, and compact; is mounted on a strong wrought-iron frame, with high wheels, and springs for rapid travelling; the pump, self-lubricating piston, and valves are of gun-metal, to work the foulest water without injury; the

boiler is of steel, with copper tubes to generate steam quickly, and stand great pressure; and the pump will throw large or small bodies of water to great distances. The engine is fully equipped with suction and delivery hose, branch pipes, wrenches, tank, &c.

Prize Medal Great Exhibition, 1851, awarded to the "Prince Albert."
Prize Medal Paris Exhibition, 1855, awarded to "L'Empereur."



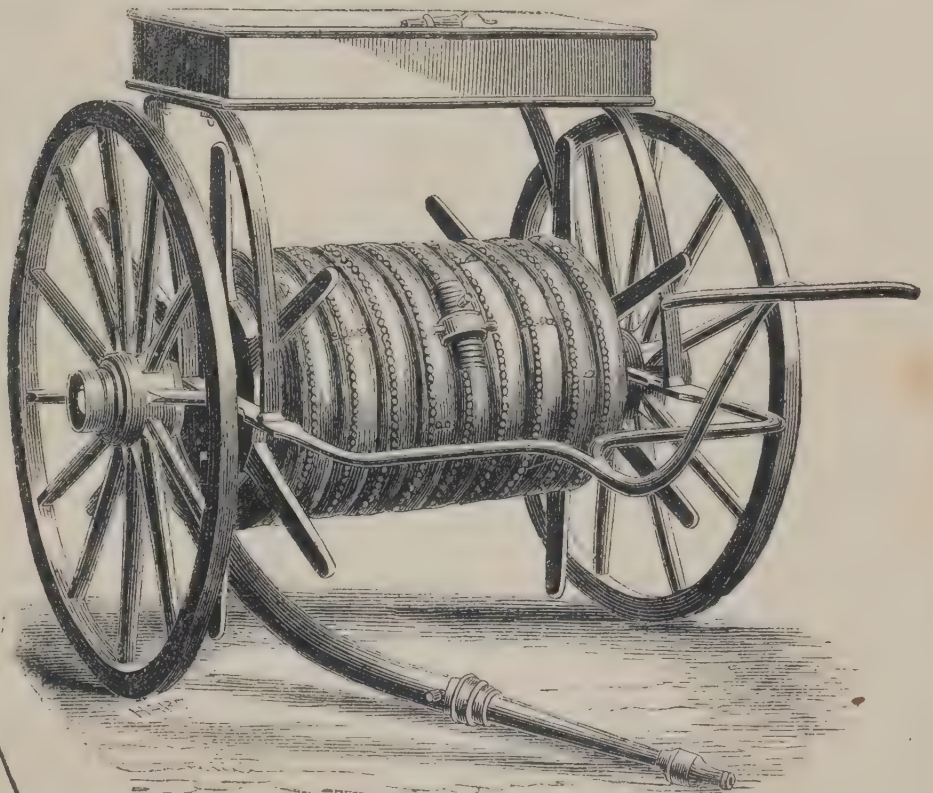
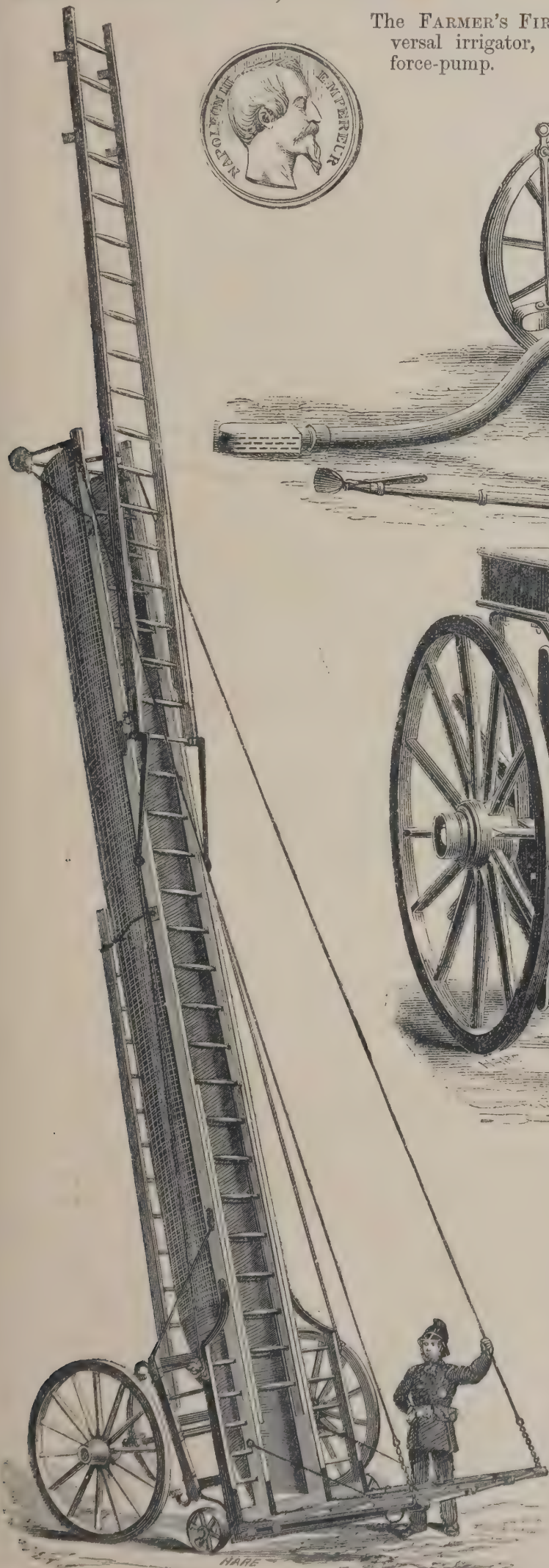
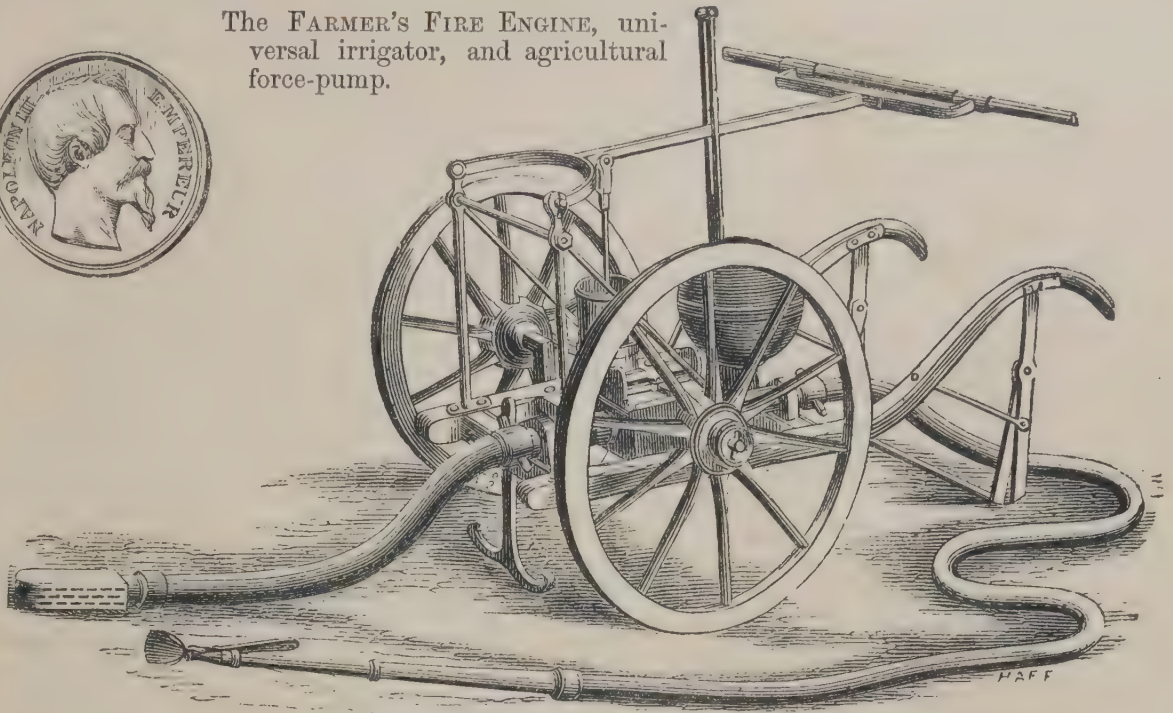
MERRYWEATHER AND SON'S IMPROVED LONDON BRIGADE FIRE ENGINE.

MERRYWEATHER & SON'S IMPROVED LONDON BRIGADE FIRE ENGINE, to be drawn by horses or men; with gun-metal pumps, pistons, and valves in separate valve-chambers; spherical copper air vessel, folding handles

for 30 men, wrought-iron fore carriage, patent axle and springs, and delivery screws on both sides for lines of hose. Fully equipped with suction-pipes, hose branch-pipes, jet-spreaders, wrenches, &c.

MERRYWEATHER & SON, *continued.*

The FARMER'S FIRE ENGINE, universal irrigator, and agricultural force-pump.



MERRYWEATHER & SON'S IMPROVED HOSE REEL.

"THE PAXTON," a light country brigade or parish fire-engine for 20 men; same pattern as the London brigade engine, and similarly equipped.

MERRYWEATHER & SON'S MEDIUM-SIZE FIRE ENGINE, for railways, factories, &c. (This class of engine is made of various sizes and powers.)

METALLIC FIRE ENGINES, for tropical climates, in all sizes.

PORTABLE FIRE ENGINE for ships, halls, & mansions.

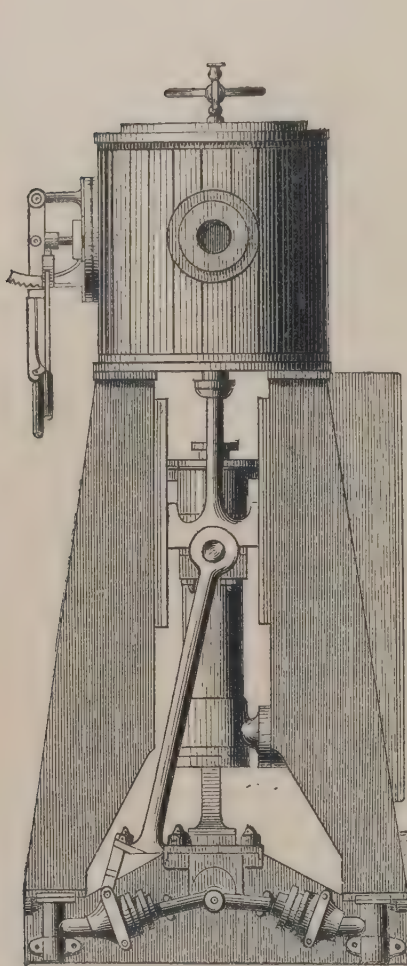
CABINET FIRE ENGINE for boudoirs, picture galleries.

Specimens of leather and other hose; coupling joints; hand pumps; stand pipes; fire cocks; helmets; belts and axes; leather and canvas buckets; fire ladders; domestic fire escape, &c.

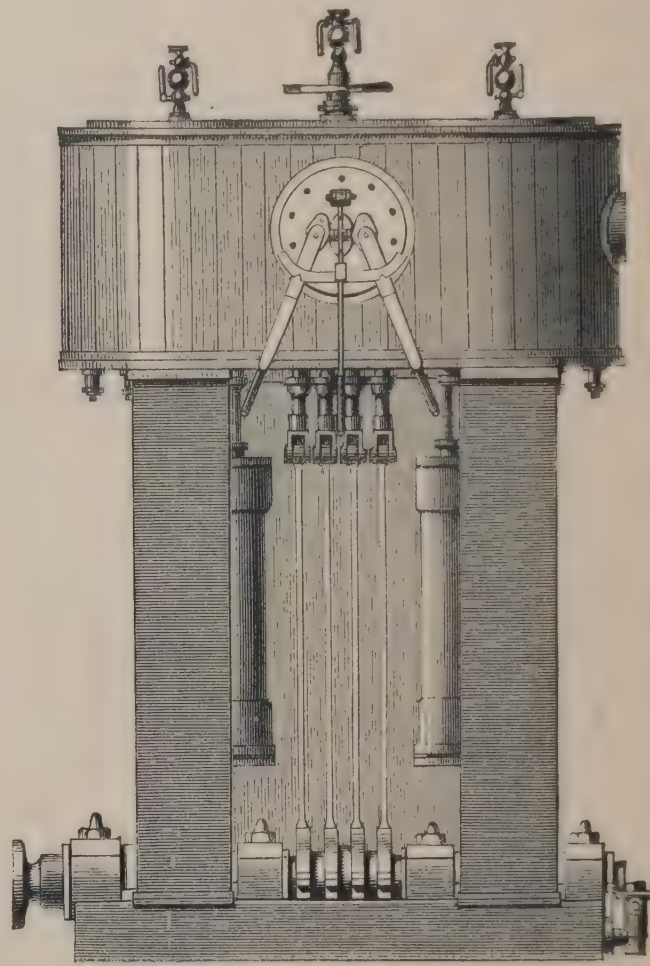
The whole of these fire-engines and apparatus, being placed at the disposal of Her Majesty's Commissioners, are stationed in various places, for the protection of the Exhibition building.

MERRYWEATHER & SON'S IMPROVED FIRE ESCAPE, as used in London, Dublin, and many provincial and foreign towns, to reach 60 ft.

MORRISON, ROBERT, & Co., *Ouse-burn Engine Works, Newcastle-upon-Tyne.*—High-pressure surface condensing expansive marine engine, cut-off variable.



SIDE ELEVATION.



P. M. DELAMOTTE.

FRONT ELEVATION.

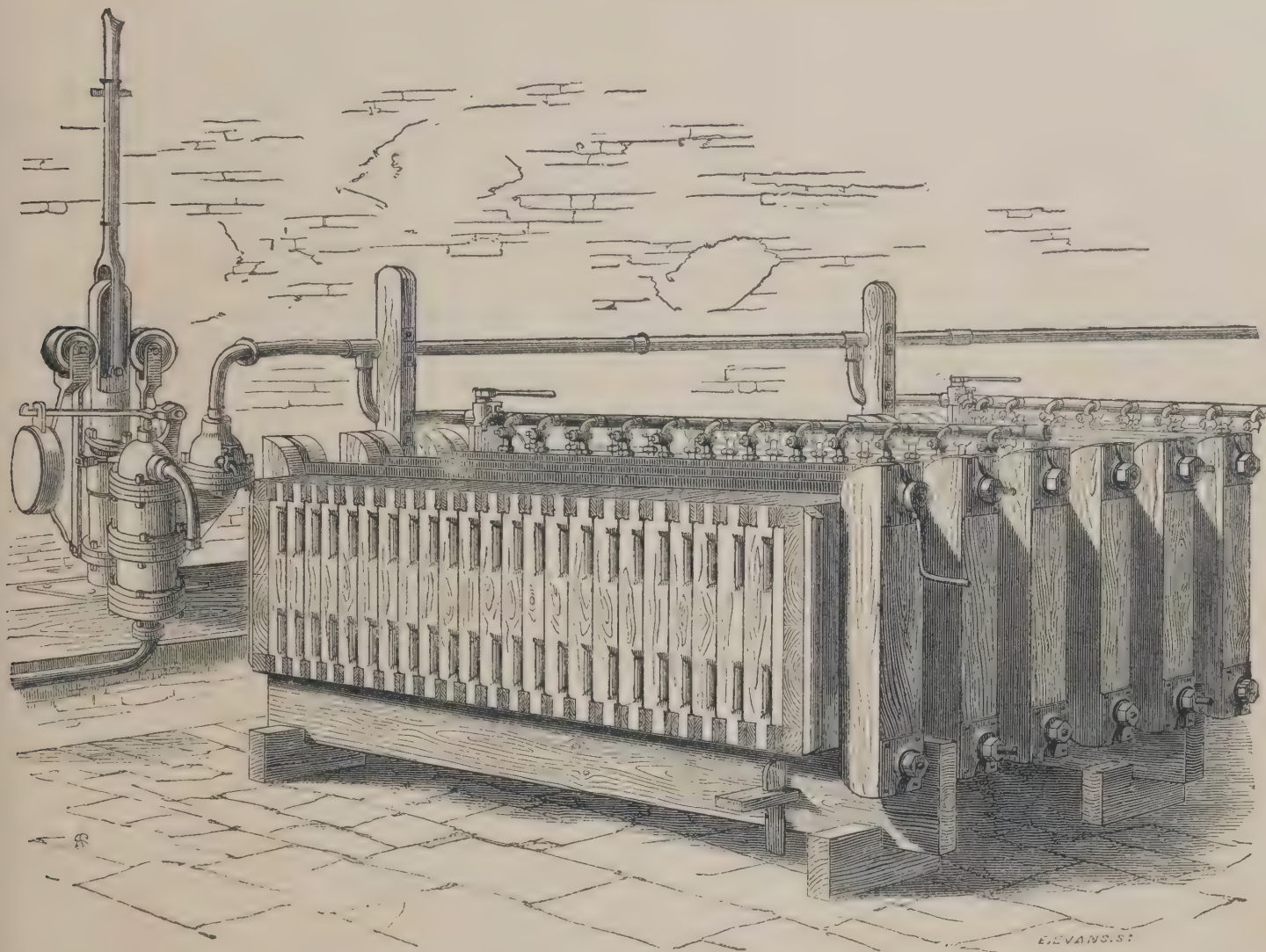
CONDENSING EXPANSIVE MARINE ENGINE.

The above engraving shows a side and front elevation of these engines. The cylinders are inverted, and with the slide chest are completely surrounded with steam. There is an ordinary and expansive slide to each cylinder, each worked direct by a single eccentric. The two main eccentrics are connected together, and are loose on the shaft, being retained in their proper positions, for going a-head or a-stern, by stops bolted to the shaft. The two expansive eccentrics are also joined together, and are loose on the connecting parts of the main eccentrics, and also provided with proper stops.

Starting and reversing the engines are effected by means of a small additional valve, introduced expressly for that purpose. There is an air pump on one side, and a cold water pump on the other side of the eccentric gear, worked direct from the piston; these pumps are both single acting. There are two supports to the cylinders on

the starting side, but only one, which reaches nearly the whole length of the cylinders, on the other; in the latter are placed the tubes for the surface condenser. There is a door at the back by which to reach them, to replace or clean them. The remainder of the back support, the foundation plate, and the two front supports, all communicate together, and form a hot well to contain the distilled water pumped in by the air pump. The feed and bilge pumps are joined in front to the foundation plate, and are of the ordinary construction. These engines are intended to work at about 60 lbs. pressure above the atmosphere, and to expand from 6 to 8 times. There is a small wheel on the top of the slide chest, by turning which, the amount of expansion may be varied. This engine, though of 30 horse nominal power, stands on a space of 5 ft. 6 in. by 4 ft. The diameter of each cylinder is 18 in. and the stroke 18 in.

NEEDHAM & KITE, *Phoenix Iron Works, Vauxhall.*—Filter press for semi-fluids.



FULL SIZED FILTER PRESS, CONTAINING 600 FEET AREA OF DRAINAGE,
CAPABLE OF WORKING FROM 10 LBS. TO 100 LBS. PRESSURE UPON SQUARE INCH.

The PATENT FILTER PRESS for semi-fluids, manufactured by the patentees Needham & Kite, engineers, Phoenix Iron Works, Vauxhall, London, and Hanley, Staffordshire.

The patent filter press is used by the largest manufacturers of china and earthenware, for expressing the water from slip instead of boiling.

It is used by the largest brewers in London, Burton-on-Trent, and the United Kingdom, for rapidly clarifying drawings, and expressing beer from yeast and grounds; and also by the largest oil refiners and colour makers in the United Kingdom. It can be applied to all trades having large quantities of semi-fluids to deal with.

[1947]

NORTH BRITISH RUBBER COMPANY, *Edinburgh.*—India-rubber belting for machinery.

[1948]

NORTH MOOR FOUNDRY COMPANY, *Oldham.*—Turbines, fans, blast machines, steam turbine and fan, ship ventilators, steam engines, &c. (*See page 52.*)

[1949]

NORTON, L., 38 *Belle Sauvage Yard, Ludgate Hill.*—Model pumps; cloth tentering and wool-drying machine.

[1950]

ORKNEY, EARL OF, 3 *Ennismore Place, Hyde Park.*—Rotary engine.

NORTH MOOR FOUNDRY COMPANY, *Oldham*.—Turbines; fans; blast machines; steam turbine and fan; ship ventilators; steam engines, &c.

Obtained medal and certificates at the Paris Exhibition, 1855.

SCHIELE'S PATENT TURBINE WATER WHEEL, with shaft vertical, 30-horse power, for 25 ft. fall. (See *Engineer* of 8th February, 1862.)

SCHIELE'S PATENT TURBINE WATER WHEEL, with shaft horizontal, 15-horse power, for 50 ft. fall. (See *Practical Mechanics' Journal*, July, 1861.)

SCHIELE & WILLIAMS' PATENT VENTILATOR, for ships—steam-engine and fan combined—for ventilating the holds and cabins, cooling the engine-rooms and stoke-holes, and increasing the draught of the fires; will produce 600,000 cubic ft. of air per hour; space occupied, 3 ft. square.

HIGH-PRESSURE STEAM ENGINE, with expansion gear, variable to any extent, either by hand or by governor. Price (exclusive of expansion gear, which costs 20 per cent. extra),

12-horse power engine	£110
8-horse power engine	70

PLATT & SCHIELE'S PATENT FAN for blowing smiths' fires, melting iron, blowing puddling and mill furnaces, glass furnaces, and for ventilating coal mines, &c.

PLATT & SCHIELE'S PATENT EXHAUST FAN, for drying wool, cotton, &c. and for a variety of purposes where exhaustion is required; will pass 300,000 cubic ft. of air per hour.

PLATT & SCHIELE'S PATENT COMPOUND OR HIGH-PRESSURE FAN (working model), for smelting and refining metals, and for other purposes requiring blast of 1 lb. to 2 lbs. pressure, and upwards.

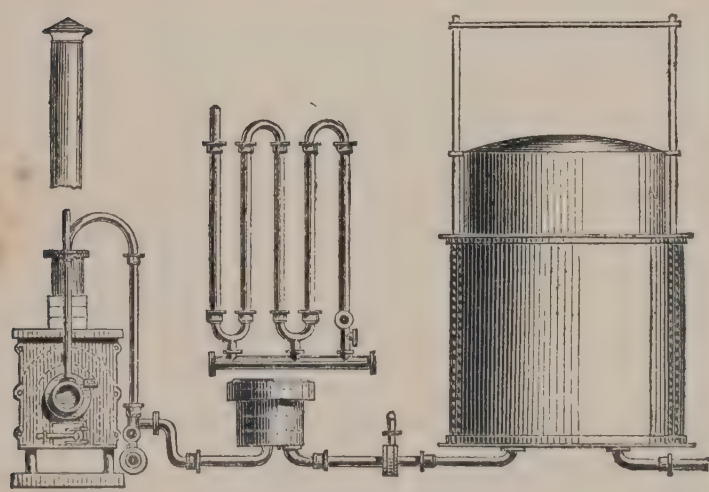
SCHIELE'S PATENT PORTABLE SMITHS' HEARTH AND BLAST ENGINE combined.	
Blast engine	£10
Hearth	14

SCHIELE'S PATENT BLAST ENGINE, OR STEAM ENGINE AND FAN combined, will blow 30 smiths' fires, or melt 4½ tons of metal per hour. It is also very suitable for mine ventilation, as it will exhaust or produce 600,000 cubic ft. of air per hour.
Price £70

For further information see the North Moor Foundry Company's illustrated lists.

[1951]

OXLEY, WILLIAM, & CO., *St. Mary's Churchyard, Parsonage, Manchester*.—Mill furnishings; lubricators; syphon boxes; air valves; strapping; sliver cans; gas works.

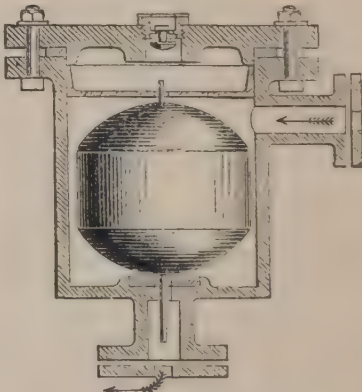


OXLEY'S IMPROVED PORTABLE GAS WORKS, suitable for mansions, railways, and small works, from £28.

MACHINES.

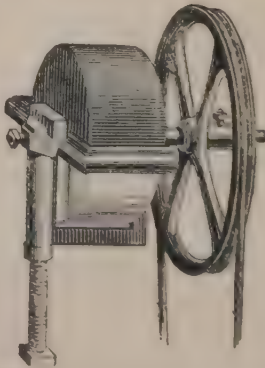
BOWDEN'S STEAM TRAP, or Syphon Box, for discharging condensed steam water.

1. To carry 10lbs.	£1 10
2. ditto 25	1 15
3. ditto 50	2 10
4. ditto 80	4 0



BOWDEN'S STEAM TRAP.

OXLEY'S SELF-ACTING LUBRICATORS, for oiling the journals of shafting while in motion. Price per dozen . £2 0 0



OXLEY'S SELF-ACTING LUBRICATOR.

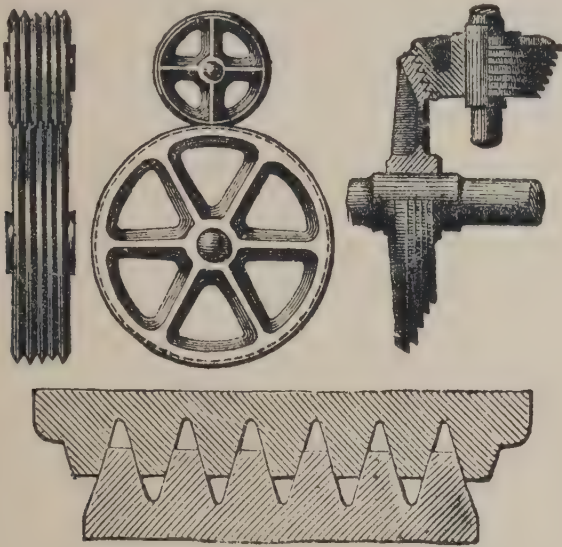
Case containing specimen spindles, flyers, and various articles of mill furnishings.

[1952]

PARKIN, WILLIAM, 13½ *Lovell Street, Attercliffe Road, Sheffield.*—Metallic railway key; cast-steel piston head.

[1953]

The PATENT FRICTIONAL GEARING COMPANY, *Glasgow.*—Specimens and examples of the application of Robertson's patent frictional gearing.



PATENT FRICTIONAL GEARING.

MACHINERY IN MOTION.

DOUBLE-CYLINDER STEAM WINCH, geared with wedge and grooved frictional wheels, with patent break movement, the steam cylinders 6 in. diameter, stroke 10 in. capable of lifting 2 tons.

STEAM ENGINE WITH CIRCULAR SAW for cutting hot iron, driven by wedge and grooved frictional wheels, steam cylinder, 7 in. diameter, stroke 10 in.; circular saw 3 ft. 6 in. diameter.

HOISTING AND TRAVERSING STEAM ENGINE for travelling cranes geared with frictional wedge and grooved bevel wheels, cylinder 5 in. diameter, stroke 10 inches.

SMALL STEAM ENGINE and MODEL of DAVISON'S PATENT

HOT AIR, geared with wedge and grooved frictional wheels.

SPECIMENS OF PATENT WEDGE AND GROOVED FRICTIONAL GEARING AND FASTENINGS.

Pair of spur wheels.

Pair of bevel wheels.

Pair of mitre wheels.

Pair of wedge and groove adjustable tyred plate wheels.

Wedge and grooved disc couplings and keys.

Frictional screw motion.

Two models of hoists.

Rolled iron wedge and groove fastenings for iron structures; girders, roofs, plate work, &c.

DRAWINGS.

Seven sectional drawings of patent wedge and grooved wheel surfaces.

Steam engine and main factory gearing, for increasing speed.

Incline hauling engine, with frictional gearing and patent break movement.

Steam engine and rolling mill geared with frictional wheels.

Steam engine with circular saw for cutting wood, geared with frictional wheels.

Single cylinder hoisting engine, geared with frictional wheels with patent break movement.

Steam engine and fan, driven by frictional wheels.

Frictional screwing rolls for straightening round bars and tubes.

Two drawings of warehouse hoists.

A drawing of shafts with wedge and grooved couplings.

Drawings illustrative of the action and application of frictional screws.

[1954]

PEEL, WILLIAMS, & PEEL, *Soho Iron Works, Manchester.*—Steam engine. (See page 54.)

[1955]

PENN, J., & SONS, *Greenwich.*—Marine engine.

[1956]

PERREAUX & Co., 5 *Jeffrey's Square, London, E.C.*—Patent India-rubber pump valves, and India-rubber as applied to mechanics.

[1957]

POTIER, WILLIAM, *Green Street, Wellington Street, Blackfriars Road.*—Gut wheel-bands.

[1958]

POTTS, JOHN, *Derby Lane, Burton-on-Trent.*—Working model of steam engine made of glass, showing the piston valves and other movements.

[1959]

PRELLER, C. A., 4 *Lant Street, London, S.E.*—Machine driving belts. (See page 55.)

[1960]

RANDOLPH, ELDER, & Co., *Glasgow.*—Drawing of Marine Engine.

[1961]

RANSOMES & SIMS, *Ipswich.*—Portable double-cylinder steam engine, &c. (See pages 56 and 57.)

[1962]

RAVENHILL, SALKELD, & Co., *Glass House Fields, Ratcliff, and Orchard Wharf, Blackwall.*—Models of marine steam engines. (See pages 58 and 59.)

PEEL, WILLIAMS, & PEEL, *Soho Iron Works, Manchester.*—Steam engine, hydraulic press, and pumps for beet-root sugar works.

Fig. 1 represents a powerful HYDRAULIC PRESS, having a cylinder of 12 in. diameter, capable of exerting a pressure of 340 tons, with water at a pressure of 3 tons per square in. It is provided with extra large water ways, which facilitate expedition in running down the table. The columns for supporting the top of the press are of wrought-iron, and turned all over perfectly true. The recesses upon which the collars of the columns rest, are planed to one true surface, to insure a uniform bearing upon each corner of the framework.

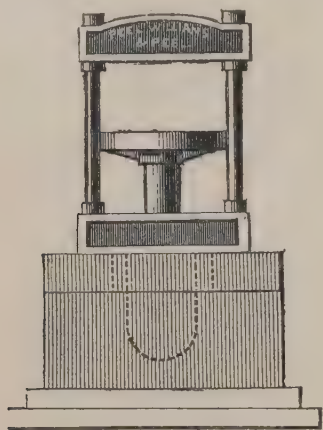


Fig. 1. HYDRAULIC PRESS.

Such presses are used for expressing the syrup or juice from beet-root, in the sugar manufactories of Southern Russia. The table has a channel along its four sides into which the syrup is collected. These presses are also applicable for a variety of other purposes; in some instances having the tables and under side of the top of the press planed true and smooth all over, for pressing paper, &c. They are also extensively used for packing cloth goods (or hay) tightly into small bales for exportation, &c.

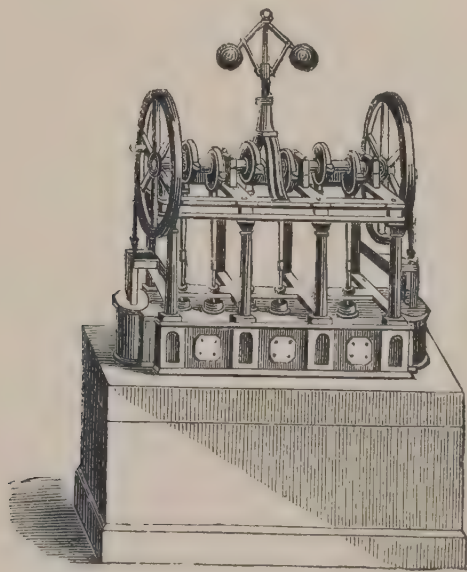


Fig. 2. HYDRAULIC-PRESS PUMPS.

Fig. 2 represents a set of HYDRAULIC-PRESS PUMPS worked by two independent steam engines, on the non-condensing principle of direct action, attached to the same framing, applicable not only to presses such as Fig. 1, but also to every description of hydraulic press.

This set consists of eight pumps, four being $1\frac{1}{2}$ in. diameter and four 1 in. diameter, all having a stroke of 3 in. Usually one of each size is used to each press, and the arrangement is such, that, by a self-acting apparatus, when a pressure of one ton to the square inch has been

reached, the larger pump ceases to act, and the final pressure is obtained by the use of the small pump alone.

The pumps receive motion from eccentrics fixed upon the crank shaft common to both engines. Suitable safety valves and also a much improved stop and let-off valve are attached to this set of pumps. The cylinders of the steam engines are 8 in. diameter and have a stroke of 16 in. and the speed may be safely varied from 80 to 100 revolutions per minute. This set of pumps possesses peculiar advantages, being entire and self-contained, consequently a very small amount of foundation is required. At the same time, the power in the cylinders is amply sufficient to work all the pumps under pressure at the same instant. A self-acting governor is attached, for regulating the velocity when a set or more of the pumps may be suddenly disengaged or otherwise; and the cylinders and all the other parts are arranged with every facility for taking to pieces to clean out, or repair. All the joinings at the junctions of the pipes, &c. are wholly metallic, no leather or other medium being used except round the working plungers. Attention is also directed to the very efficient mode adopted, for compensating the slackness occasioned by the wear of the slide blocks of the engine piston rods, as also the knuckle-joints of the pump rods.

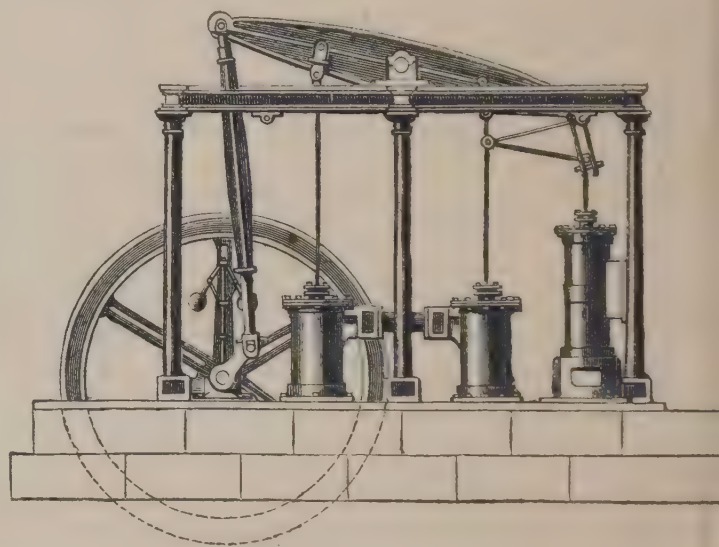
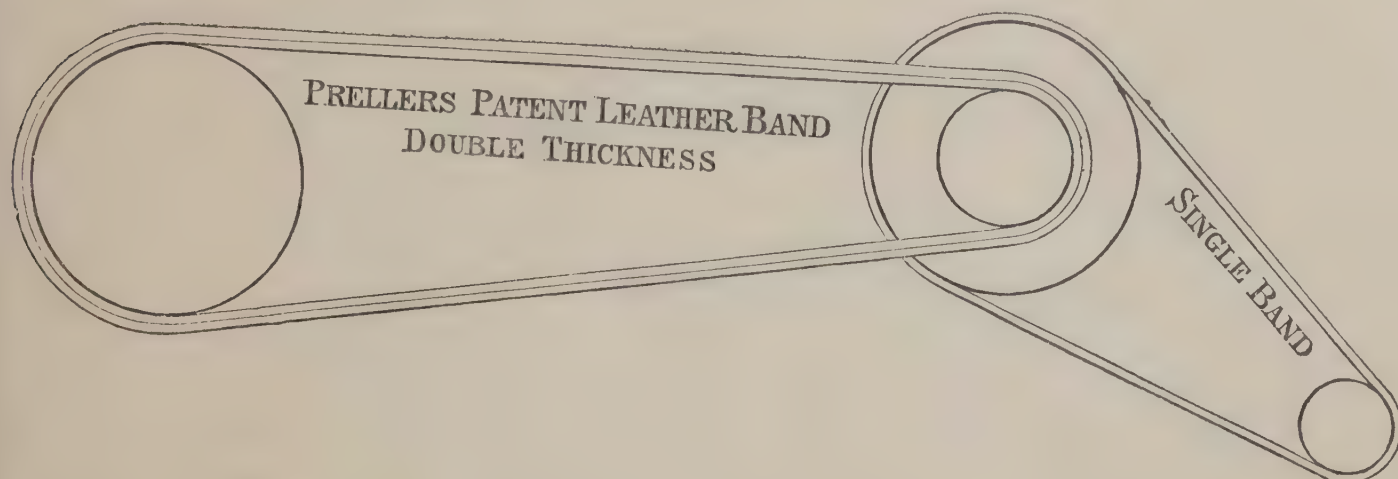


Fig. 3. VACUUM ENGINE.

Fig. 3 represents a steam engine, technically known as a "vacuum engine." It is nominally of 16-horse power, and is constructed on the non-condensing principle. It is fitted with two vacuum pumps 18 in. diameter, and 18 in. stroke, all the valves being of vulcanized india-rubber. The purpose for which this class of engine is employed, is for creating and maintaining a vacuum in the sugar boiling pans, thereby producing ebullition and vaporisation, at a much lower temperature than is usual in vessels used for such purposes, when subject to atmospheric pressure, by which means a superior quality and colour of sugar is produced. It is provided also with two additional pumps, one for supplying cold water to a cistern for general use, and the other for supplying water to the boiler. Either or both of these pumps may be used or dispensed with as circumstances require. The speed of this engine is 50 revolutions per minute, and power may be taken by a broad belt from the periphery of the fly wheel formed for that purpose, or by gearing from the fly wheel shaft. This engine and pumps are not only applicable to the work already referred to, but are also well adapted to sugar refineries, and may be made with the airpumps upon the double-acting principle, thus giving out twice the effect, in which case a cylinder proportionately larger will be necessary; and although the engine exhibited is arranged to work at a speed of 50 revolutions per minute, this may be varied at pleasure to a considerable extent.

PRELLER, C. A., 4 *Lant Street, London, S.E.*—Machine driving belts for transmitting power, made of leather, combining extraordinary strength with suppleness.



By experiments in the Woolwich Dockyard (made on October 24, 1855, and repeated on April 27, 1858), it has been ascertained, that Preller's leather is at least 50 per cent. stronger than tanned leather, and consequently far superior to all substitutes for leather.

Eminent engineers are of opinion that the thinness of a band is a great advantage; but this depends upon the nature of the material used: if weak and spongy, thickness is required; but in proportion to the greater strength and density of material, bands may be made thinner.

Preller's bands are in use all over the Kingdom, in different parts of Europe, India, Australia, South America, &c.

For hot climates the yellow leather is particularly suitable, and the grain never cracks in working even when the greatest power is applied.

All bands made of Preller's leather are warranted to be cut from the prime part of the hide (no shoulder being used), and are sewn with Preller's laces and twice stretched.

[1963]

RAWLINGS, JAMES, 10 *Carlton Hill East, N.W.*—Machine for cleaning boots with 2 brushes simultaneously, without inserting the hand.

[1964]

RENNIE, GEORGE, & SONS, 6 *Holland Street, Blackfriars, and Greenwich.*—Marine condensing engine for screw propellers, high and low pressure, with surface condensation. (*See page 62.*)

[1965]

RICHARDSON, THOMAS, & SONS, *Hartlepool.*—A pair of direct-acting inverted cylindrical marine condensing engines.

[1966]

RICHMOND, JOHN, *Hackney Wick Works, Victoria Park, N.E.*—Counting machines.

[1967]

RILEY, GEORGE, *South Lambeth.*—Patent helical refrigerator for brewers. Patent slotted false bottom for brewers.

[1968]

ROBERTS, RICHARD, & Co., 10 *Adam Street, Adelphi.*—Drawing and model of turbine.

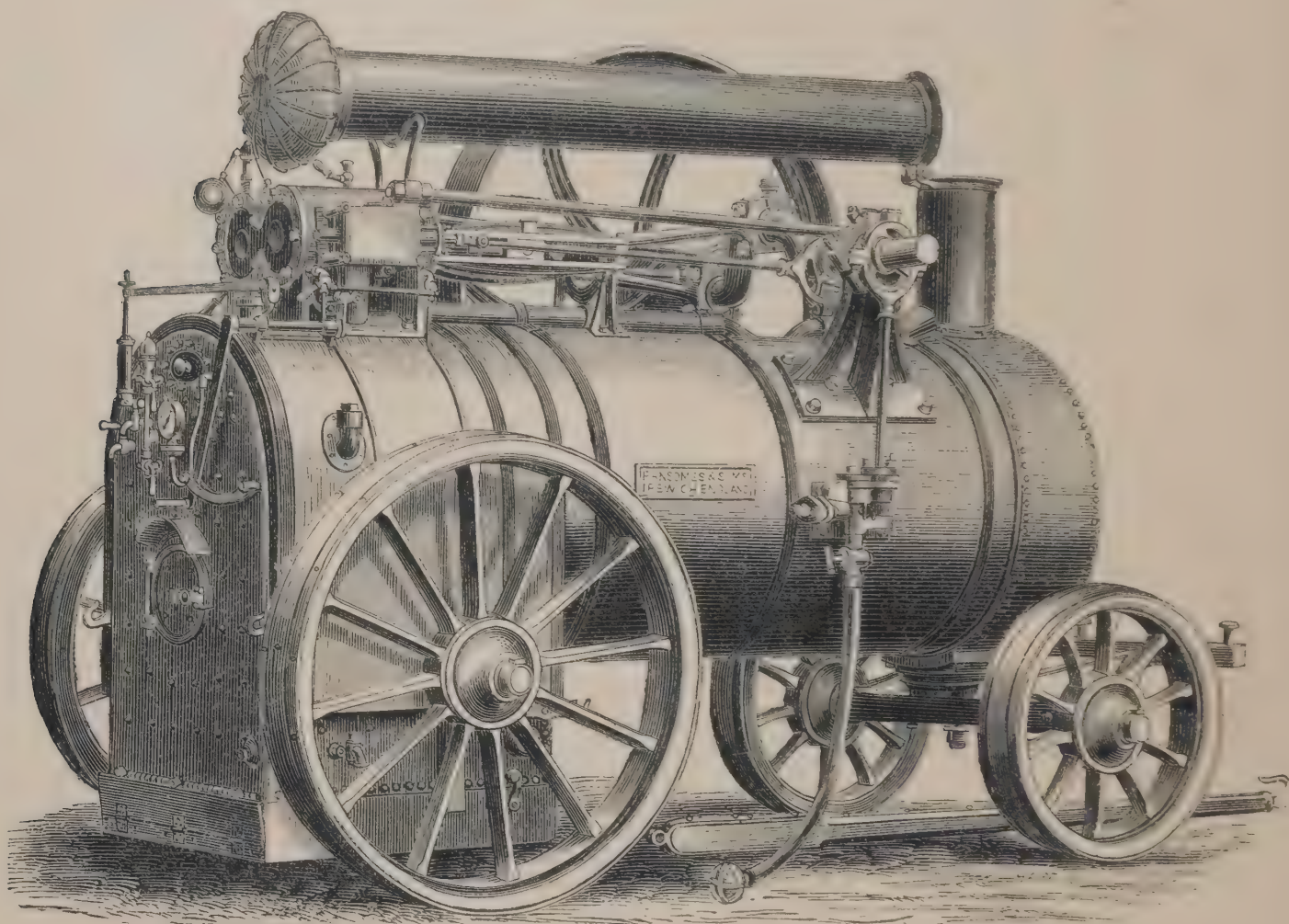
[1969]

ROBERTS, WILLIAM, *Millwall, Poplar, E.*—Fire engines for house, factory, and general purposes. (*See pages 60 and 61.*)

[1970]

ROBINSON, WILLIAM, *Bridgwater.*—Machine for cleaning the inside of casks without unheading, adapted for breweries, &c. (*See page 61.*)

RANSOMES & SIMS, *Ipswich*.—Portable double-cylinder steam engine, 20-horse power; portable steam crab, 5-horse power.



20-HORSE POWER DOUBLE-CYLINDER HIGH-PRESSURE STEAM ENGINE.

This engine is the largest of the exhibitors' standard series of portable steam engines, which are made from 3 to 20 horse power.

These portable steam engines are extremely simple, durable, and easy to manage; and are capable of application to almost all purposes where steam is required, such as working circular, horizontal, or vertical saws for cutting timber; for driving pumps for irrigation, mill-stones and mill gear, quartz-crushing machines, stampers, amalgamators, &c.; and are built for burning either wood or coal, a great desideratum in countries where coal is scarce.

The boiler, which is multitubular, is of the exhibitors' own make, and is constructed with especial reference to durability, on the same model as the most approved locomotive boilers. The bulk of the plates are Low Moor, the others being best Staffordshire. Ample water-space is given round the fire box, and between the tubes, for the free circulation of the water, the escape of steam, and the settling of sediment. The boiler is tested by hydraulic pressure to 100 lbs. per square inch. It is fitted with a steam gauge, glass water-gauge, steam whistle, 2 gauge cocks, safety valve with spring balance, blow-off cock, &c. &c. and is lagged with wood, covered with sheet-iron. It is fitted with a lock-up safety valve when so ordered.

The chimney is furnished with a wire top, which extinguishes all sparks and prevents all danger of fire.

The crank shaft and connecting rods are of wrought-iron, and all small wearing parts are case-hardened.

The fly wheel is properly balanced, and can be hung on either end of the crank shaft.

The slide valve eccentric can readily be shifted to admit more or less steam, according to the amount of work to

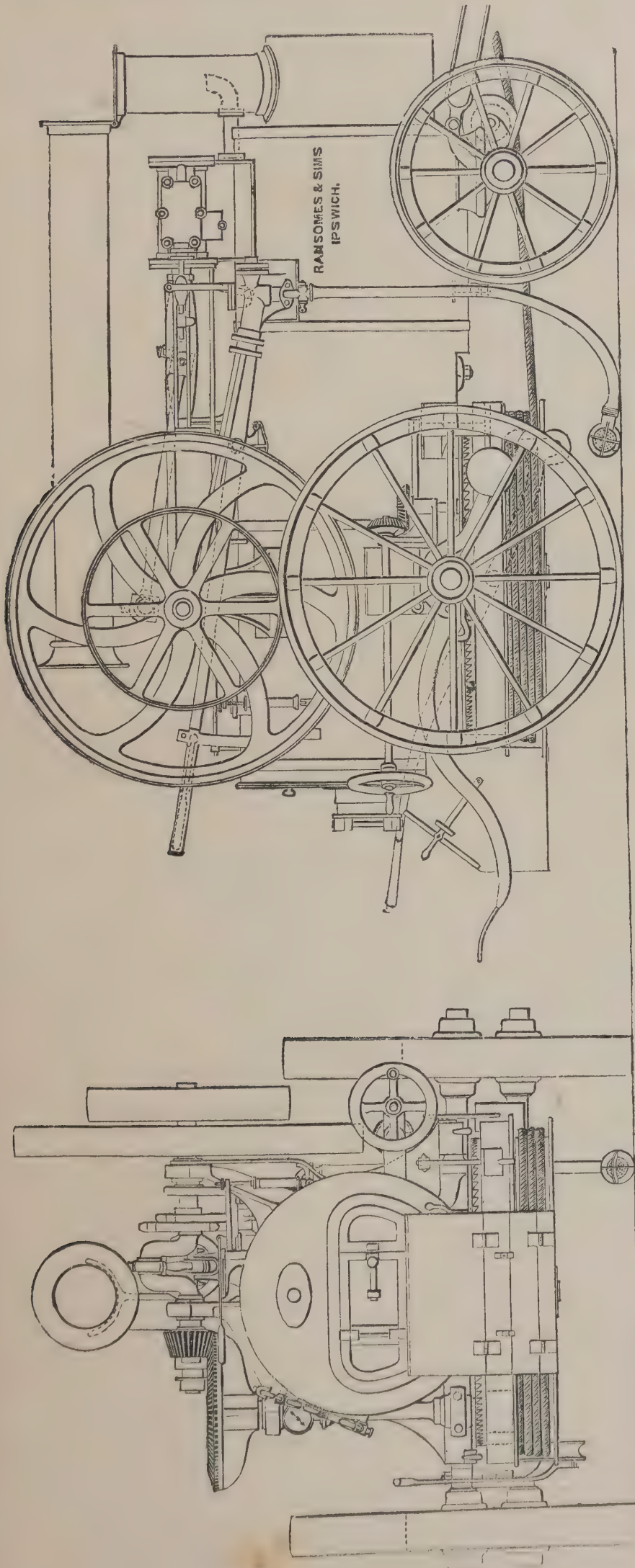
be performed, or to reverse the motion of the engine, if necessary.

The power is calculated at 45 lbs. pressure of steam in the boiler. Every engine is tested under steam before leaving the factory, and may be safely worked at 60 lbs. pressure, at which they give off double their nominal power, consuming, of course, fuel and water in the same increased proportion.

In estimating the power an engine will produce, the size of the cylinder is only one element, and by no means the most important, for it must be borne in mind that the power really depends upon the capability of the boiler to generate dry steam, as fast as the engine can utilise it. In a portable engine, the size of the boiler is limited by the condition that the engine must be easily portable; and Messrs. Ransome's engines are furnished with as large boilers as is compatible with that condition. The exhibitors have chosen a moderate sized cylinder, and a quick speed, in preference to a larger cylinder and a slow speed, as possessing, for this class of engine, very many substantial advantages; and it will be found in practice, that these engines will give off as much power, and cost a little to keep in repair, as any others of equal weight and portability, but furnished with larger cylinders.

These engines are all furnished with the following articles, viz. waterproof cover, tube brush, fire pricker, rake, shovel, screw spanners, oil can, large funnel, and spare gauge glass, which are included in the price quoted.

They are also sometimes fitted with a simple apparatus in the smoke box for heating the feed water. This economises the fuel considerably, and is not liable to get out of order.

RANSOMES & SIMS, *continued.*

5-HORSE POWER PORTABLE STEAM CRAB.

A 5-HORSE POWER PORTABLE STEAM CRAB, with Biddell and Balk's patent boiler.

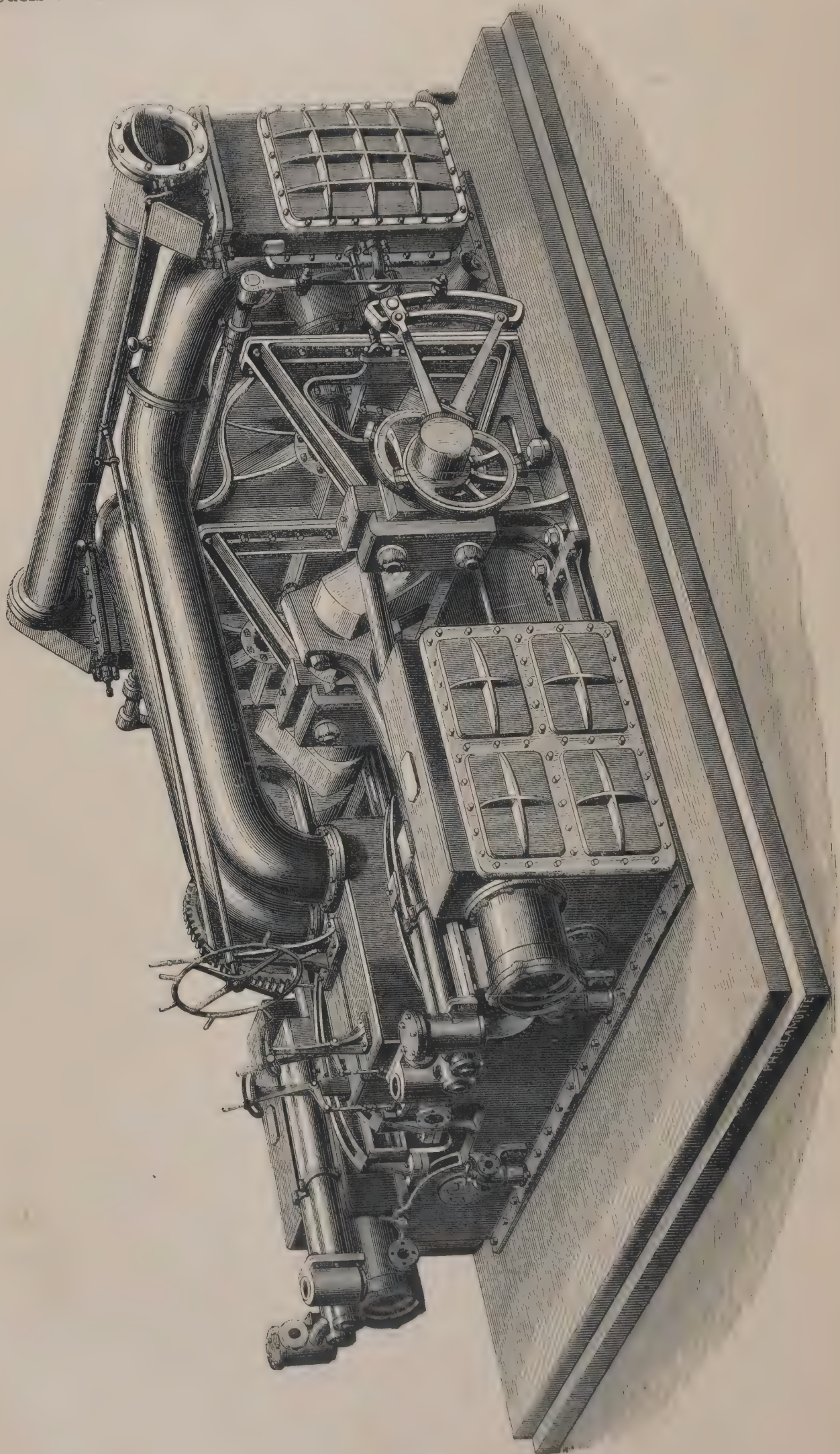
This crab is capable of raising about 25 cwt. at a rate of from 70 to 80 ft. per minute. It is especially designed for raising building materials; but if the winding gear is not required, it can be disconnected by shifting a clutch, and the engine can then, like any ordinary portable engine, be used for other purposes, such as driving a mortar mill, pumps, or circular saw, &c. The rope which generally passes through a snatch block, and over the swivel pulley on the fore carriage, is wound up on the winding drum, which is furnished with a ratchet wheel to retain it in its position, and also with a lever and rollers

to enable the driver to cause the rope to coil properly. It is also furnished with a break, which is worked by the foot of the driver, and which serves for lowering and stopping suddenly. The release of this break is made self-acting by means of a counterweight.

The engine is made to reverse to facilitate the starting, and for the purpose of unwinding the chain or rope on the drum, so as to facilitate the descent of the end of the chain or rope when empty.

Everything necessary for the working of this crab, can be done by the driver, without leaving his place.

RAVENHILL, SALKELD, & Co., *Glass House Fields, Ratcliff, and Orchard Wharf, Blackwall.*—
Models of marine steam engines.



MARINE ENGINE, FROM A PHOTOGRAPH OF MODEL NO. 2.

RAVENHILL, SALKELD, & Co., *continued.*

1. MODEL OF ENGINES with feathering paddle wheels, of the Holyhead mail packets *Leinster* and *Connaught*, each of 720 horses nominal power.

This is an application of the oscillating cylinder to the largest class of marine steam engine, each cylinder 98 inches (eight feet two inches) internal diameter, weighed, when finished, upwards of twenty tons; the condenser weighed twenty-two tons. The engines were fitted with eight tubular boilers, having forty furnaces and 4176 tubes, giving a total length of four and three quarter miles of tubing, and the vessels attained an average speed at the official trial in Stokes Bay of eighteen knots or twenty-one miles an hour. The engines exerting an indicated power of 4,751 horses.

The first pair of engines with oscillating cylinders constructed by the exhibitors was fitted in the year 1838, and engines have since been manufactured by them upon this principle of the aggregate nominal power of 22,000 horses.

2. MODEL OF ENGINES with horizontal cylinders and double piston-rods of 500 horses nominal power for screw-propellers, such as are fitted by the exhibitors on board Her Majesty's 90-gun line-of-battle ships.

This model represents the plan of engines of the larger class made by the exhibitors for the British and foreign Governments, and is arranged so as to afford easy access to all the working parts.

The exhibitors were the first to introduce the double piston-rod engine into the British navy, engines of 300 horses nominal power so fitted having been made by them in the year 1845, since which time the following ships in her Majesty's service have been so fitted by them :—

Adventure.
Alacrity.
Alert.
Amphion.
Ariel.
Assurance.
Brunswick.
Centurion.
Charybdis.
Clio.
Coquette.
Dromedary.
Emerald.

Falcon.
Fawn.
Fox.
Gannet.
Glasgow.
Greyhound.
Jason.
Lapwing.
London.
Lyra.
*Narcissus.
Nelson.
Neptune.
Newcastle.
Pelican.
Pelorus.
Pioneer.
Raccoon.
Rattlesnake.
Ringdove.
Roebuck.
**St. George.
Surprise.
Swallow.
Tamar.
Undaunted.
Victor.
Waterloo.
Wolverine.

This list refers only to engines made upon the double piston-rod plan, many other vessels in her Majesty's service having been fitted by the exhibitors upon various other systems, arranged according to the requirements of the service.

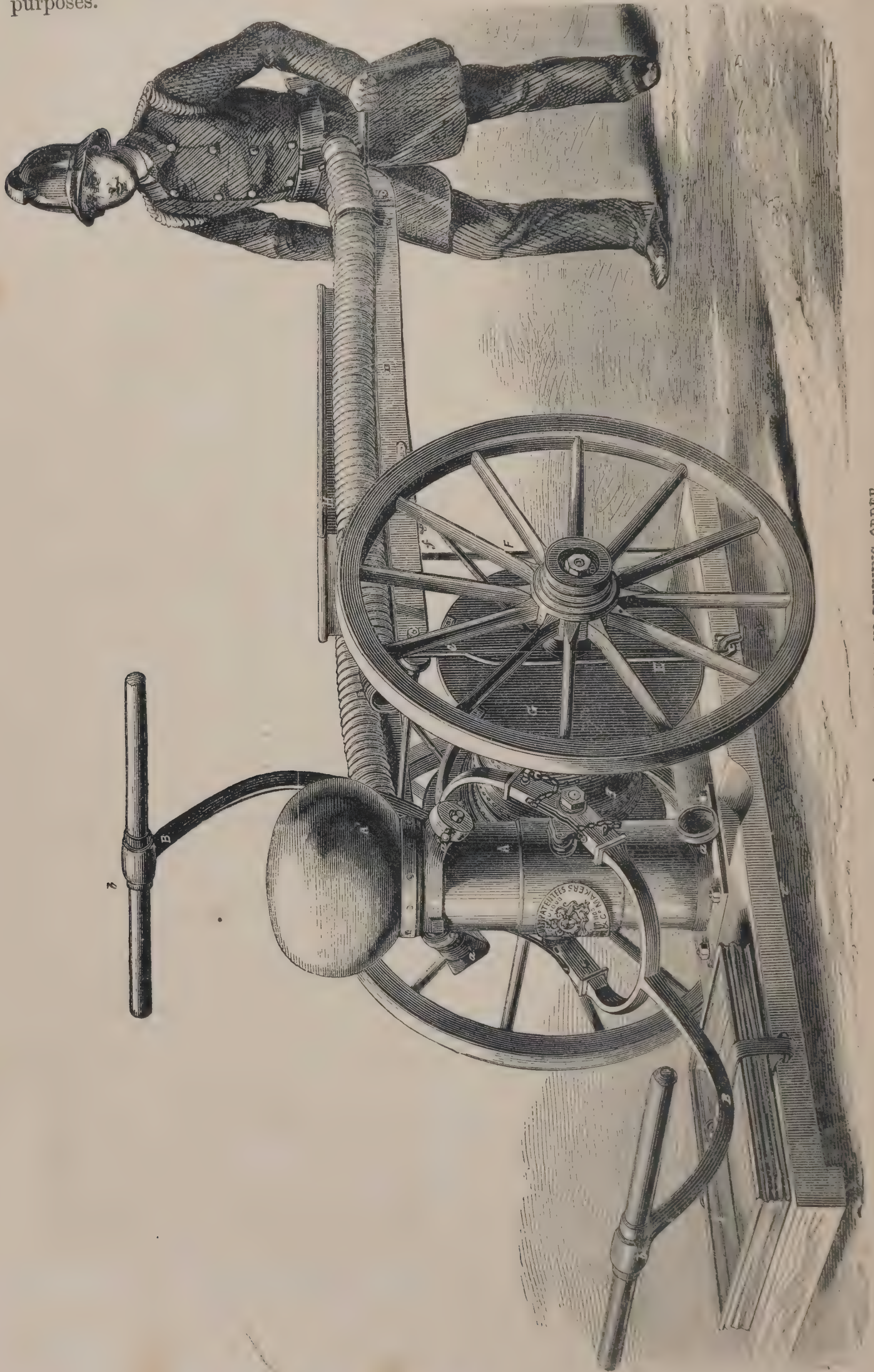
* Narcissus, 50-gun frigate, bearing the flag of Rear-Admiral Sir Baldwin W. Walker, Bart., K.C.B., late controller of the navy on the Cape of Good Hope station.

** St. George, 90-gun ship, on board which His Royal Highness Prince Alfred has been serving on the North American and West Indian station.

3. MODEL OF ENGINES of the same power as No. 2, arranged for surface condensation.

4. MODEL OF MARINE STEAM ENGINES, with inclined oscillating cylinders, designed for vessels having a small section with considerable rise of floor. Engines on this plan have been constructed by the exhibitors up to 240 horses nominal power. It is a light form of engine, and has given great satisfaction.

ROBERTS, WILLIAM, *Millwall, Poplar E.*—Fire engines for house, factory, and general purposes.



W. ROBERTS'S HAND ENGINE IN RUNNING ORDER.

ROBERTS, WILLIAM,—*continued.*

DESCRIPTION OF W. ROBERTS'S PORTABLE FIRE-ENGINE.

- A* Pump having one suction at *a* through the side, and another in the bottom, which (the bottom) is screwed in the cylinder; also two deliveries, *a*¹ *a*¹, the air-chamber *A*¹ being screwed on the top, thus affording a ready means of access to the interior.
- BB* Levers with wood handles *b b*.
- C* Plank or bed, having an axle hooked at the ends *cc*, and at the end of the plank a plate *C*¹, with a latch *C*².
- DDD* Frames either of metal, or metal and wood combined.
- EE* Suspending rods working between the upright frames upon bolts at *ee*, the lower ends being hooked.
- F* Rod having a **T** foot, and connected with the frame at *f*.
- GG* Hose reel working upon the axle freely between the side frames *DDDD*, and upon which the hose is coiled.
- H* A box to carry the branch pipe, jets, spanners, and all the necessary tools. The suction hose can be carried upon the bed *C* at each side of the pump, or beside the box *H*, or both, if a long length is required.
- I* Canvas well, or cistern.
When used for horse traction, a seat is fitted to the frame to carry the driver and three firemen. The seat folds down upon the frame when not required.

Upon reaching a fire, the latch *C*² is thrown back, and the foot of the rod *F* withdrawn from the slot; this allows the handle end of the frame to rise; this action lowers the pump upon the ground, when the suspended rods *EE* being unhooked (the hose *g* being kept screwed to the pump), the reel is run towards the fire; when the necessary length being unwound, it is disconnected from the reel, the branch, spanners, &c., being in the box *H*, it can be got to work in a very few minutes. When done with, the whole can be quickly packed up and taken away.

ROBINSON, WILLIAM, *Bridgwater*.—Machine for cleansing the inside of casks without unheading, adapted for breweries, &c.

PATENT CASK-CLEANSING MACHINES, for brewers, wine and spirit merchants and vinegar makers, &c.

These machines consist of two circular frames, one within the other. The outer one when set in motion revolves on its axis, and the inner one at the same time is moved in a circular direction, by lifts connected with each axle of the outer frame.

They can be worked by either hand or steam power; in shape and general construction they are exceedingly strong and durable; and being sent out in complete working order, no expense is incurred in fixing.

A cask, on being placed in the machine as shown in the diagram, speedily assumes a diagonal position, passing to the perpendicular, or head over head, and finally to the horizontal, thereby subjecting every part of the cask to the cleansing material, and rendering the labour, wear and tear of unheading the foulest cask unnecessary.

One machine worked by either hand or steam power will clean, of ordinary sweet casks 150 hogsheads or barrels, or 300 kilderkins, or firkins, per day, and one half that number of foul casks.

The superiority of these machines over any other yet introduced, consists in effectually cleansing a greater number of casks in the same time, and also in the capability of taking every size from a hogshead downwards.

THE FOLLOWING FIRE ENGINES, &c. ARE EXHIBITED:—

1. W. ROBERTS' PATENT FIRE ENGINE FOR 1 HORSE.

This engine will throw nearly as much water under pressure, as a brigade engine, with two-thirds the number of men to work it. It is about half the weight, and will pass through an opening one-third narrower.

Price £100 0
Hose and all gear extra.

2. W. ROBERTS' PATENT HAND FIRE ENGINE upon wheels, carrying its own hose and gear, can be run easily by 1 man. Price £50 0

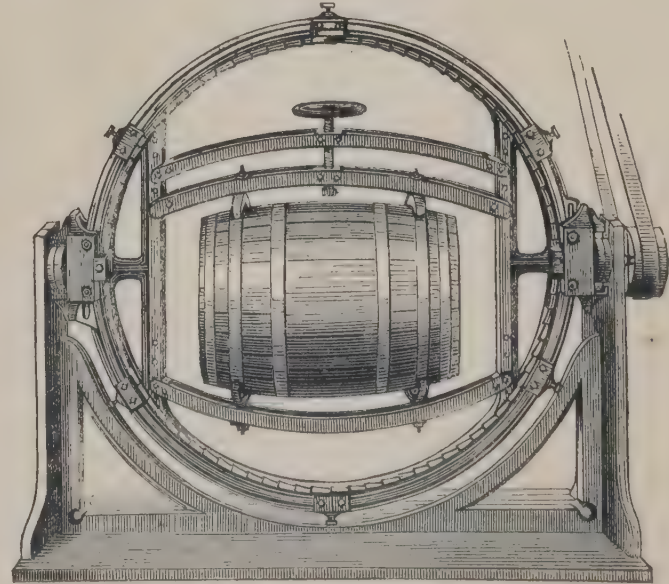
3. W. ROBERTS' PATENT HAND FIRE ENGINE, will throw more than half the quantity of a brigade engine with one-third the number of men. Weight about 2 cwt. Price £28 0

4. W. ROBERTS' IMPROVED HOSE REEL FOR 1 HORSE.
This reel will carry as much hose and gear as three brigade engines, and is specially adapted for use in cities or towns, having a constant supply of water at high-pressure.

5. W. ROBERTS' IMPROVED HOSE REEL FOR HAND WORK.
This reel will carry as much hose and gear as two brigade engines. Price £15 0

Manufactured by Brown, Lenox, & Co., Millwall, Poplar, London.

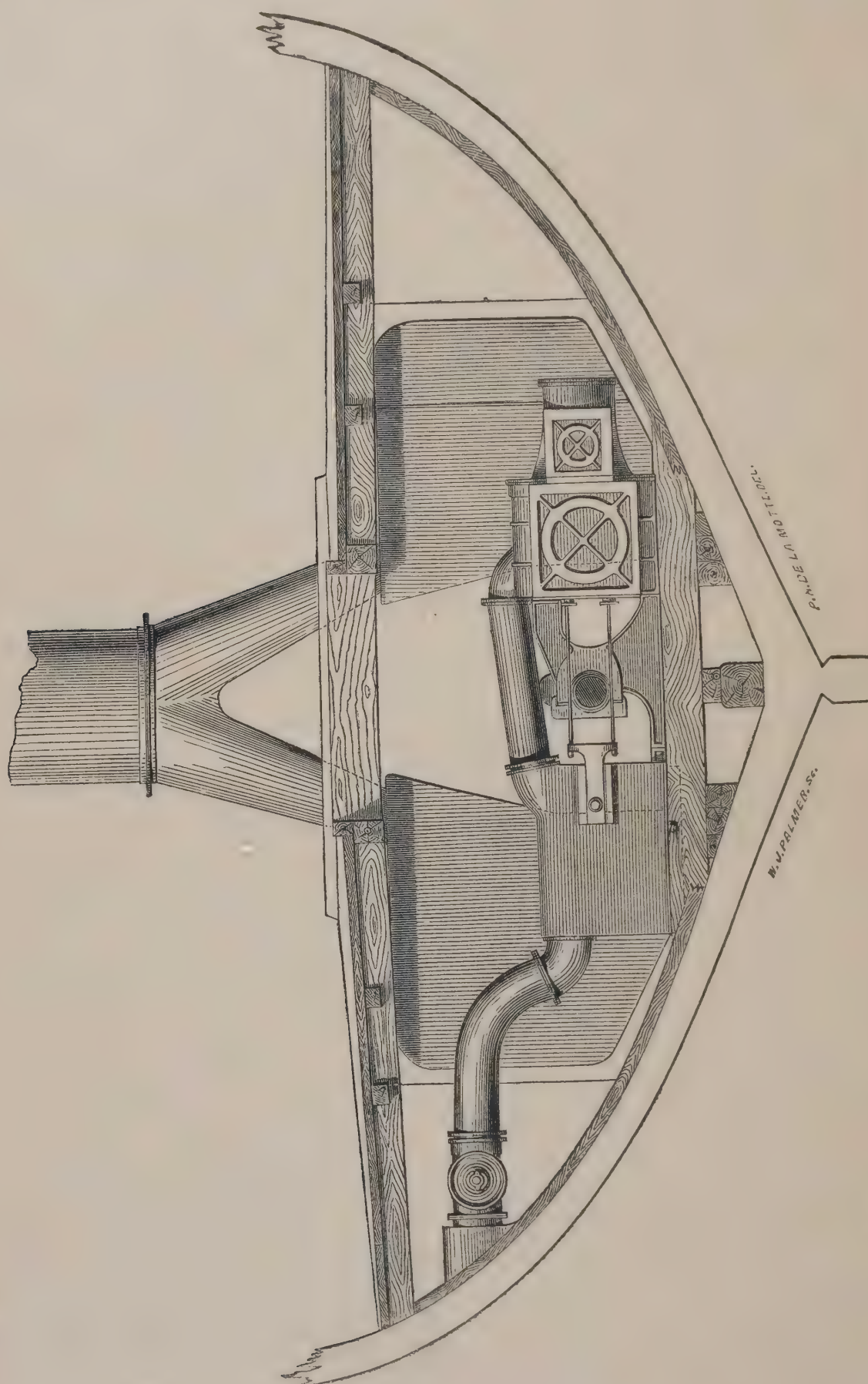
These machines are therefore especially adapted for the use of brewers, wine and spirit merchants, vinegar makers, &c.



Price £30 complete for Steam Power.

References to a large number of firms now using them, together with testimonials of the highest character, may be had by applying to the patentee.
Prices from £22 to £35

RENNIE, GEORGE, & SONS, 6 *Holland Street, Blackfriars, and Greenwich.*—Marine condensing engine for screw propellers, high and low pressure, with surface condensation.



MARINE CONDENSING ENGINE FOR SCREW PROPELLER HIGH AND LOW PRESSURE, WITH SURFACE CONDENSATION.

HIGH AND LOW PRESSURE MARINE CONDENSING ENGINE.

The above is an engraving of a high and low pressure, marine screw steam engine, placed in a vessel of war.

In class 8 is exhibited a working model of the above arrangement.

The advantage of 2 cylinders in direct-acting marine screw engines, is that of working steam expansively, whereby economy of steam and fuel is obtained, depending upon the pressure of steam, and the relative volumes of the high and low pressure cylinders. The engines are

fitted with surface condensers, with copper tubes, and improved centrifugal pumps for circulating the water in condensers; these pumps being made on a double curvature principle; of least resistance to the flow of water occasioned by the centrifugal force generated by the angular velocity of the pump.

Engines on the above principle are fitted with boilers in proportion; apparatus for super-heating the steam, and feed-water heaters may be made to consume not more than 2 lbs. of coal per actual or indicated horse-power.

[1971]

ROSE, WILLIAM, 37 *Victoria Street, Manchester*.—Brigade fire engine and three patent portable fire engines, with fittings.

The exhibitor is a builder of fire engines, and manufacturer of fire-extinguishing apparatus. He is the sole builder of Hall's patent portable fire engine, also sole agent for Vaucher's patent woven hose, which will bear a

pressure of 200 lbs. to the square inch. A large stock of brigade and portable engines with fittings on view at the depôt.

[1972]

ROUTLEDGE & OMMANNEY, *Salford, Manchester*.—Diagonal and double-acting engines, hydraulic-press pumps, self-acting boiler feeder; machine for cleaning brass turnings, &c.

[1973]

RUSE, CHARLES, 24 *Hereford Place, Commercial Road East, London, E.*—Two improved beer machines.

[1974]

RUSSELL, JOHN, & Co., *London, Wednesbury, Walsall, and Manchester*.—Wrought-iron tubes for boilers, gas, water, and steam.

The exhibitors are patent tube manufacturers, the original makers of wrought-iron gas tubes, and the inventors of the lap-welded tubes for locomotive and marine boilers. They also manufacture all kinds of tubes and fittings for gas, steam, or water; galvanised tubes and fittings; brass-work of all kinds for steam and gas; stocks, dies, and taps of all sizes.

The warehouses of John Russell & Co. are at 69, Upper Thames Street, and 5 Charles Street, Soho, London; and 35 Granby Row, Manchester; and the works, at Wednesbury, and at Walsall, Staffordshire.

All communications should be addressed, 69 Upper Thames Street, E.C. London.

[1975]

RUSSELL, JAMES, & SONS, *Wednesbury, and Upper Ground Street, Blackfriars, S.*—Iron tubes, iron and brass fittings.

Obtained honourable mention for lap-welded iron tubes at the *American Exhibition*; and a gold medal at the *Paris Exhibition*, 1855.

The exhibitors are the patentees and original makers of wrought-iron tubes.

[1976]

RUSSELL, J. SCOTT, *London*.—Three cylinder surface condensing marine steam engines. (*See page 64.*)

[1977]

RUSTON, PROCTOR, & Co., *Lincoln*.—Portable, fixed, and traction steam engines; flour and sawing mills.

[1978]

SALTER, GEORGE, & Co., *West Bromwich*.—Spring balances; dynamometers; spiral springs; pressure gauges; roasting jacks; bayonets; and swords. (*See page 65.*)

[1979]

SAMUELSON & Co., *Hull*.—Oil mill.

[1980]

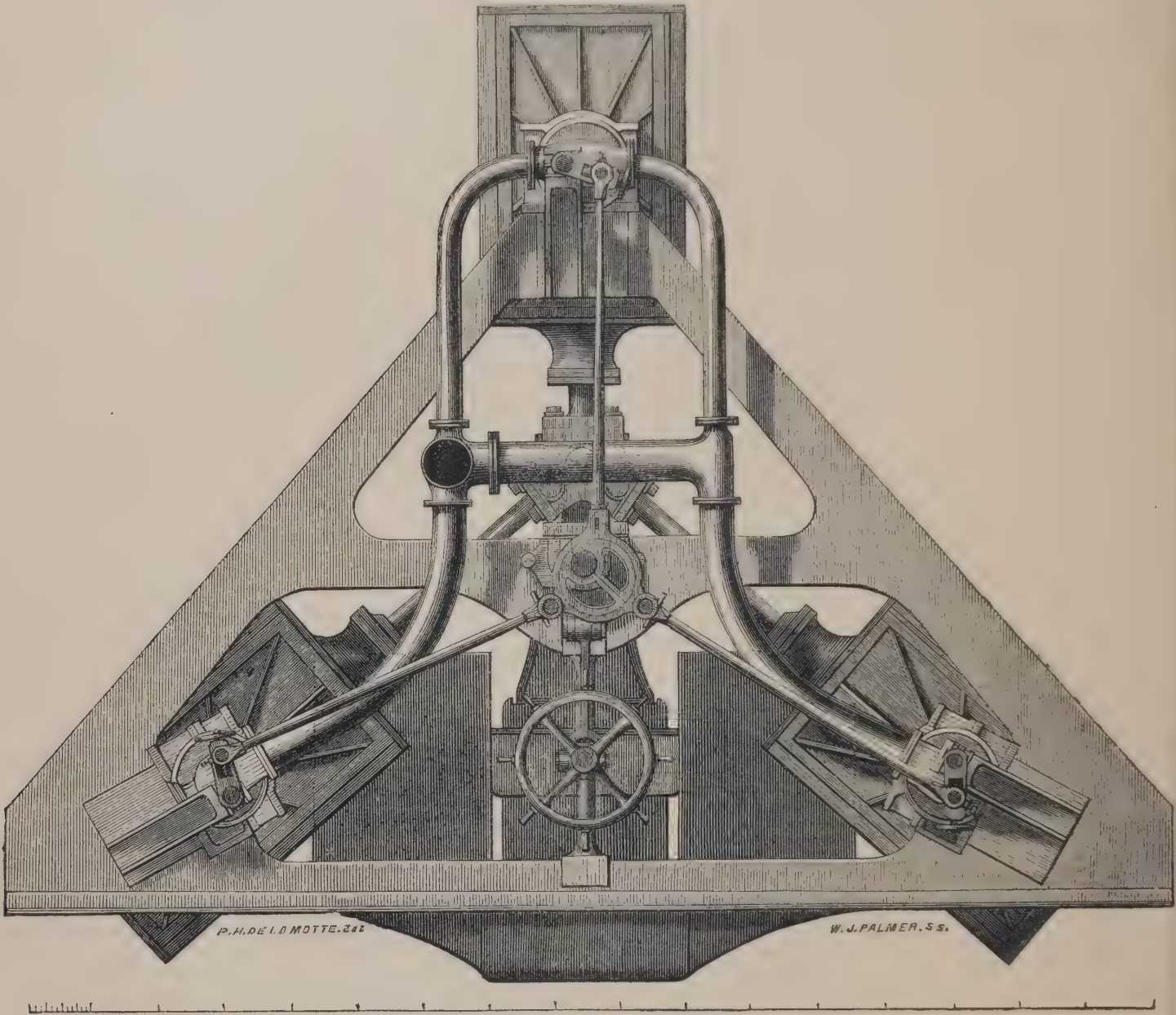
SANDERS, FREDERIC, 473 *Oxford Street*.—Improvement in beer engine pumps, and spirit machines.

STOCKER'S IMPROVED PATENT BEER ENGINE, AND CRYSTAL SPIRIT FOUNTAINS.

These beer engines combine elegance, cheapness, and durability; and having no slot or sweep for the handle

to work in, no dirt or grit can come in contact with the works. They are manufactured in mahogany, marble, and pewter. The improved crystal spirit fountain is of elegant design, and handsome ornament for licensed victuallers' counters.

RUSSELL, J. SCOTT, *London*.—Three-cylinder surface condensing marine steam engine.



THREE-CYLINDER MARINE STEAM ENGINE.

THREE CYLINDER MARINE STEAM ENGINE AS ARRANGED FOR SCREW PROPELLER.

Collective power	100 horses.
Works expansively	with variable cut off.
Surface condensers	with India rubber packing.
Diameter of cylinder	30 inches.
Length of stroke	3 feet.

[1981]

SANDYS, VIVIAN, & Co., *Copper House Foundry, Hayle, Cornwall*.—18-horse power high pressure horizontal steam engine.

[1982]

SCOTT, G., *35 Page's Walk, Bermondsey*.—Portable engine, oscillating engine, surface condenser.

SALTER, GEORGE, & Co., *West Bromwich*.—Spring balances, dynamometers, spiral springs, pressure gauges, roasting jacks, bayonets, and swords.

The exhibitors are manufacturers of spring balances, vertical jacks, swords, bayonets, pressure gauges, pocket steelyards, steel springs, &c.

The following are exhibited, viz. :—

1. Small spring balances for locomotive and stationary engines.
2. Large spring balances for locomotive and stationary engines.
3. Patent pressure gauges in iron and brass cases, and gauges suitable for hydraulic presses.
4. Spring balances with straight movement for general weighing purposes.
5. Spring balances with circular movement for general weighing purposes.
6. Large dial weighing machines for railways, warehouses, &c.
7. Cheap dial weighing machines, registered pattern.
8. Patent quadrant pattern spring balances.
9. Patent counter spring weighing machine.
10. Spring letter balances.
11. Sportsman's pocket spring balances.
12. Spring balances for testing strength of cotton, yarn, gunlocks, &c.
13. Dynamometer for testing human strength.
14. Steel spiral springs.
15. Bayonets, sword bayonets, and cutlasses.
16. Pocket steelyards.
17. Extra strong vertical jacks.

[1983]

SEARBY, GEORGE, 2 *Crown Court, Threadneedle Street*.—Steam gauge.

SEARBY'S PATENT IMPROVED STEAM GAUGE (Mercurial). The advantages of this gauge are its cheapness, durability, and safety. It is manufactured on the only principle on which a steam gauge can act with	certainty, and its internal arrangements, unlike all mechanical gauges, are in no danger of getting out of order. It also acts as a safety valve. It has been approved by many of the first engineers in the Kingdom.
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[1984]

SHAND & MASON, *Blackfriars Road, London*.—Steam, brigade, military, and other fire engines, implements, &c. (*See pages 68 and 69.*)

[1985]

SHEPARD, EDWARD C., *Victoria Street, Westminster*.—Magneto-electric machine for electric light, and street lamp carburator. (*See page 66.*)

[1986]

SIEBE, DANIEL, 17 *Mason Street, Lambeth*.—Harrison's patent ice-making machine. (*See page 67.*)

SHEPARD, EDWARD C., *Victoria Street, Westminster*.—Magneto-electric machine for electric light, and street lamp carburator.

MAGNETO-ELECTRIC MACHINE, AND ELECTRIC LAMP, with an improved frotter, for producing a continuous electric light for lighthouses, steamers, signals, &c.

This machine possesses great advantages over all others in having a continuous frotter, which, with the improved electric lamp used with it, produces a continuous, steady, and uniform electric light, burning with unvarying intensity.

The beauty and brilliance of the electric light are undisputed. It shines through the midnight gloom, with a lustre, second only to that of the noonday sun; and so pure and white is it, that all other flames assume a

red tinge by contrast. It can be used for railway signals, for lighting mines, harbours, &c. and is of especial value for use on board steamers and sailing vessels; materially reducing the risks of loss and damage from collision. It is invaluable for lighthouse use on dangerous coasts, where, for want of a light of sufficient power to reveal the hidden dangers, there has been such appalling loss of life and property.

STREET LAMP CARBURATOR. This apparatus effects a saving of one half the gas, and increases the brilliancy of the light. Over 2,000 carburators are already fitted to street lamps in London.

[1987]

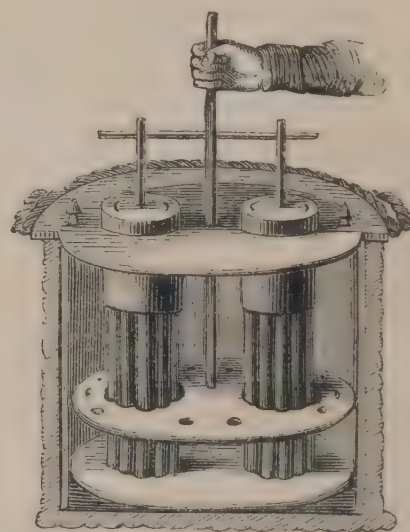
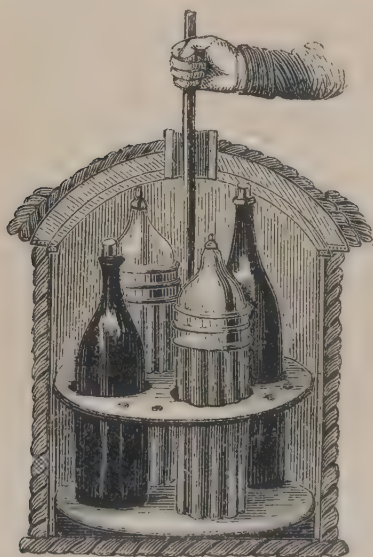
SIEMENS, C. WILLIAM, 3 *Great George Street, Westminster*.—Regenerative gas engine and furnaces; fluid meters.

[1988]

SIMPSON, G., *Glasgow*.—Pumps.

[1989]

SIMPSON, GEORGE, 315 *Oxford Street*.—Ash's piston freezing machine and wine cooler; freezing vases; refrigerators; seltzogenes, &c.



GEORGE SIMPSON is the sole manufacturer of ASH'S PATENT PISTON FREEZING MACHINE and WINE COOLER, for producing, with or without ice, several kinds of dessert ices ready moulded for the table and blocks of pure ice, for icing wines, &c. The whole can be performed at one operation, or separately as

desired. For hot climates this machine surpasses any other kind known.

Freezing vases, refrigerators or ice safes, butter coolers, and every article connected with the ice trade, seltzogenes for making soda water, &c. rotary knife cleaners, filters, and other patented inventions may be obtained from the exhibitor.

[1990]

SISSONS & WHITE, *Hull*.—Steam pile driver, simple, practical, economical, easily moved and occupying small space. (See page 70.)

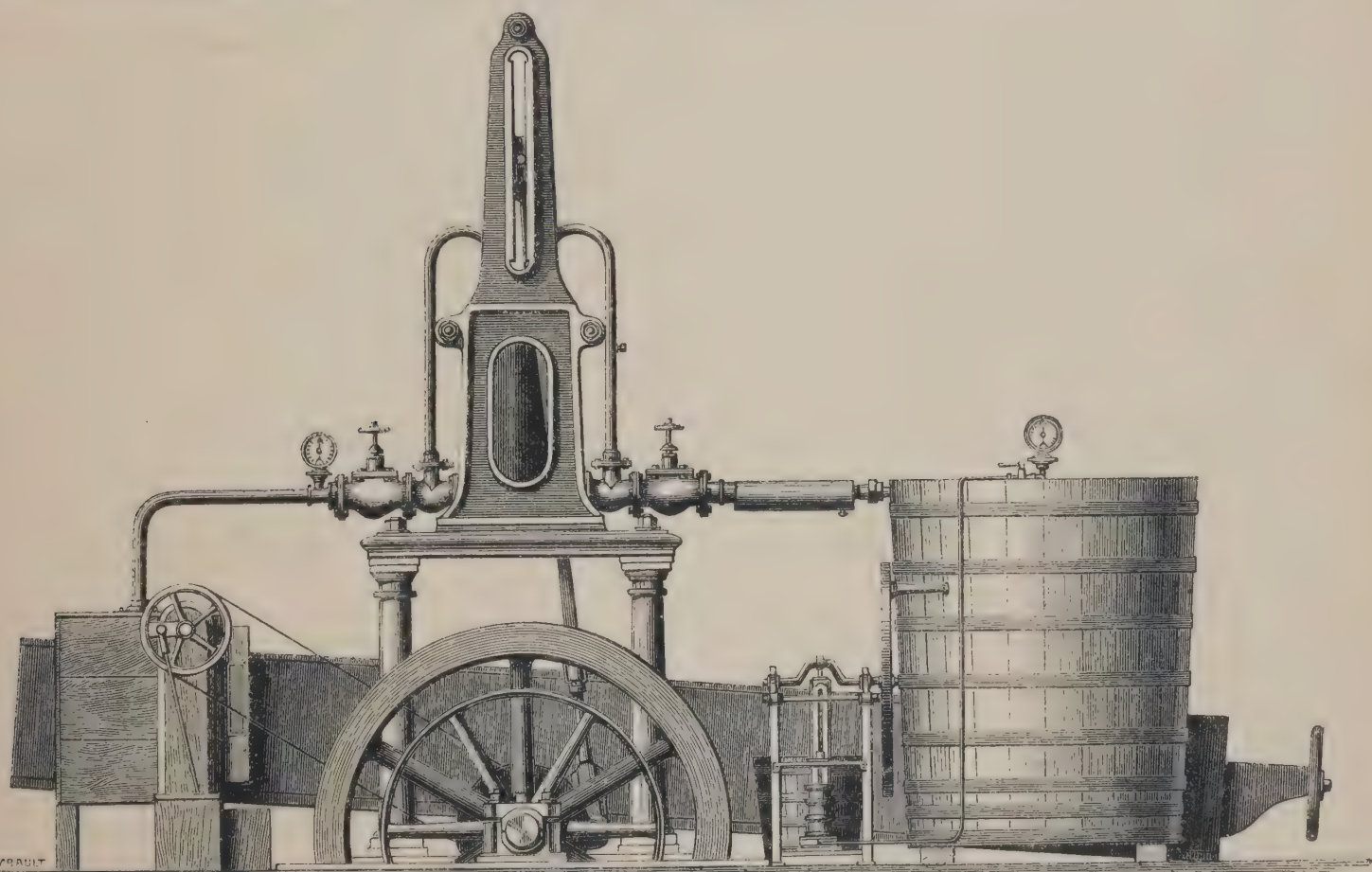
SIEBE, DANIEL, 17 *Mason Street, Lambeth.*—Harrison's patent ice-making machine.

PATENT IMPROVED ICE-MAKING MACHINE, capable of converting 24 cwt. (= 269 gallons) of spring or river water into blocks of solid ice without the use of chemicals, the ice being more or less transparent, in proportion to the relative quantity acted on at the same time.

The principle upon which this machine is constructed, is an application of the well known natural law, that, by evaporating fluids, the caloric contained therein passes off with the vapour, thereby reducing the temperature of the evaporating body. It will be seen on referring to the apparatus that science has been brought to the aid of nature, in the first place by the use of a volatile fluid as an evaporative agent; secondly, by a powerful pump, which, in its continued efforts to form a vacuum, assists the evaporation at a low temperature on the one hand, and by pressure with the assistance of water at an ordinary temperature, reduces the vapour again to a fluid on the other hand, thereby using and re-using the same volatile fluid without loss. In other words, the invention consists in the evaporation of volatile fluids *in vacuo*, at

a low temperature, and condensing at a higher temperature, by pressure, and water at an ordinary temperature.

These machines can be made of any dimensions, the largest however at present in use produces 10 tons of ice daily. The manufacture of ice in tropical climates is the most important and successful operation, both in a sanitary and pecuniary point of view, to which refrigerating machinery on this principle has yet been applied, in many countries, where cooling drinks cease to be only a luxury, and become an actual necessity to Europeans; for it has been found impossible from the difficulties of transport, and loss in transit, to keep up the supply of natural ice, or to make it a remunerative speculation. These machines have been of the greatest service; for regardless of the high atmospheric temperature, the ice is formed daily on the spot where it is required for use, thereby avoiding all loss. It may not be out of place to remark here that one of the many machines now successfully at work is established nearly under the equator in Peru, supplying the neighbourhood with ice, an article rarely if ever seen in those regions before.



PATENT IMPROVED ICE-MAKING MACHINE.

The *cooling of hospitals*, and other buildings, is a subject which of late has attracted considerable attention, the formation of thermopathic sanitoriums in India has long been felt and acknowledged by eminent medical men, and has been discussed by the commission of inquiry into the sanitary condition of the army of India. The method proposed, is to reduce to, and retain the temperature at the required degree, by artificial means, on the converse of the principle by which buildings are warmed in this country. It has been proved by experiment that this is practicable, the inside temperature of a chamber having been reduced to within 6 degrees of freezing point, whilst the thermometer outside ranged at 90° Fahrenheit. How many valuable lives of our own public men who succumb to the climate of India might be saved, and their health as well as that of our army, secured at a comparative small outlay when weighed against the benefit derived, it is impossible to form a just estimate.

The *cooling of wort* in breweries and distilleries is a process to which these machines, by reason of their immense refrigerative power and their capabilities to remove the caloric and lower the temperature of the

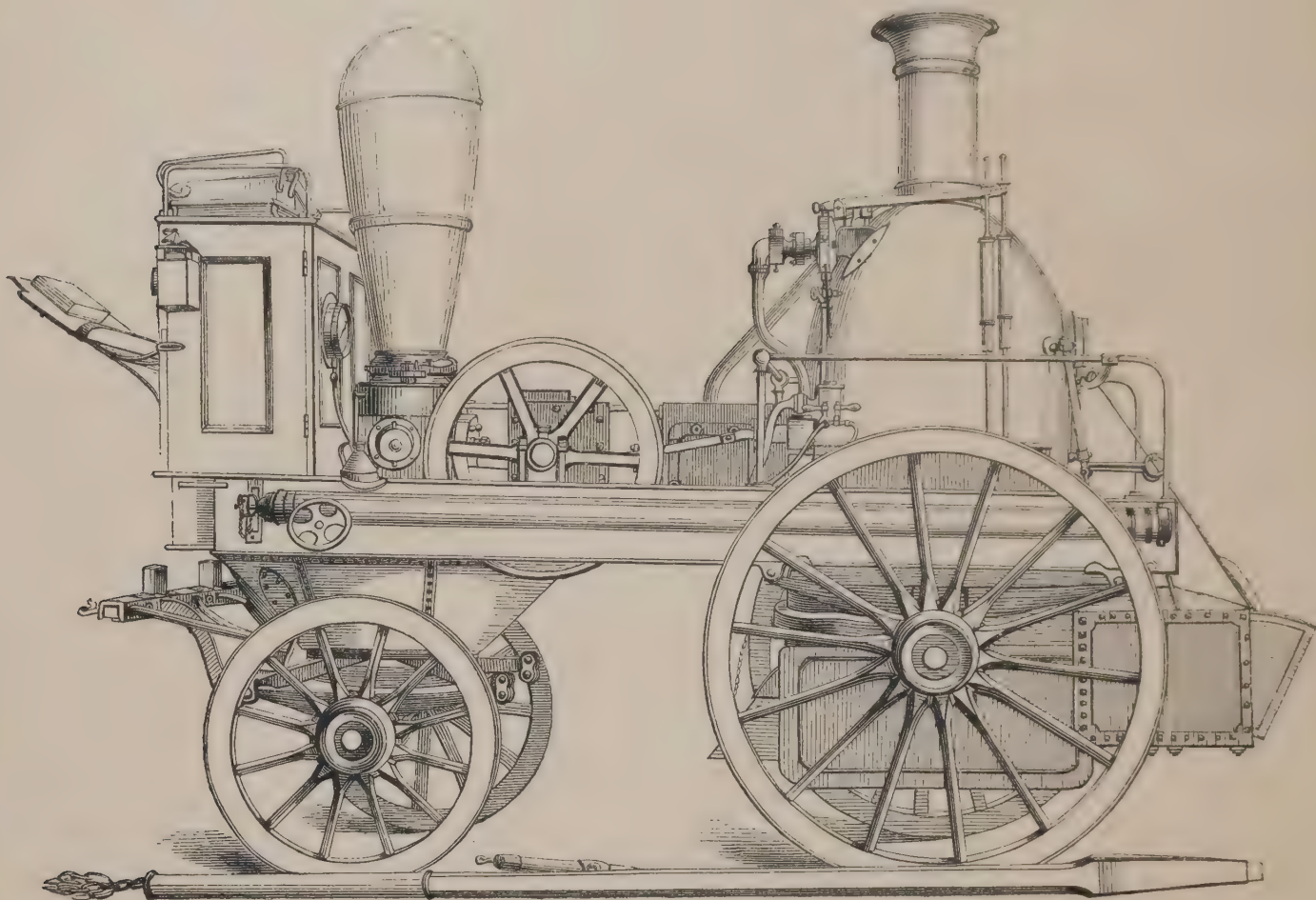
wort to any desired degree are admirably adapted. It has been tested in Australia, both by direct action and by cooling a quantity of water to be used in the ordinary refrigerators and attemperators. It thus obviates the necessity of brewing only in winter in this country, and renders it possible to brew with success in any hot climate.

Salting and preserving meat, &c. is also materially assisted, as well as purity and wholesomeness secured, by the application of refrigerating machinery. The meat being removed, before congelation takes place, to a chamber kept at a low temperature, the salting trough being also kept at or near freezing point, the formation of animalculæ is entirely prevented, and salting may be carried on at any season of the year.

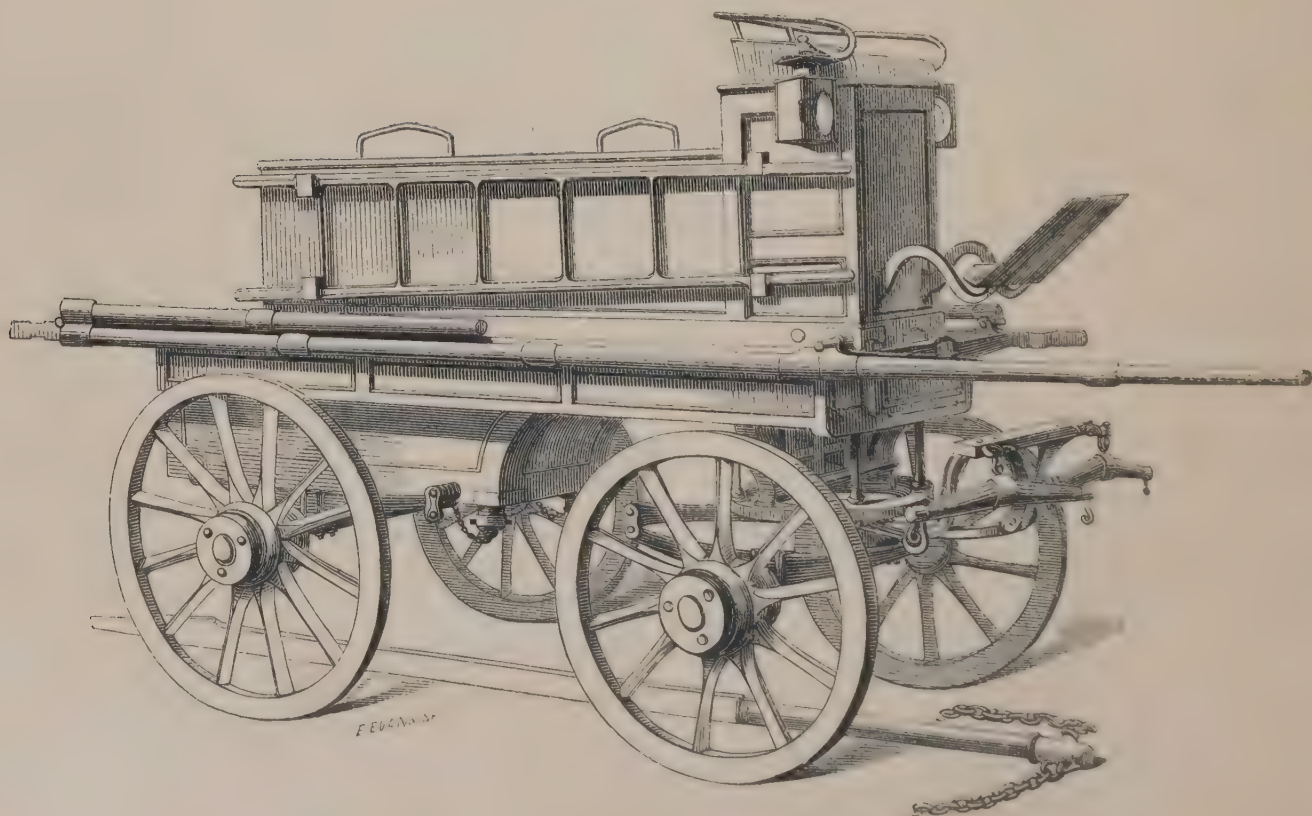
An admirable plan of preserving alimentary substances at a low temperature, has been proposed by Admiral Sir Charles Elliot, which, if carried out, would no doubt prove most valuable and beneficial.

It may be interesting to experimentalists to learn that 20° below zero (52° of cold), Fahrenheit, has been easily obtained and continued for some time.

SHAND & MASON, *Blackfriars Road, London.*—Steam, brigade, military, and other fire engines, implements, &c.

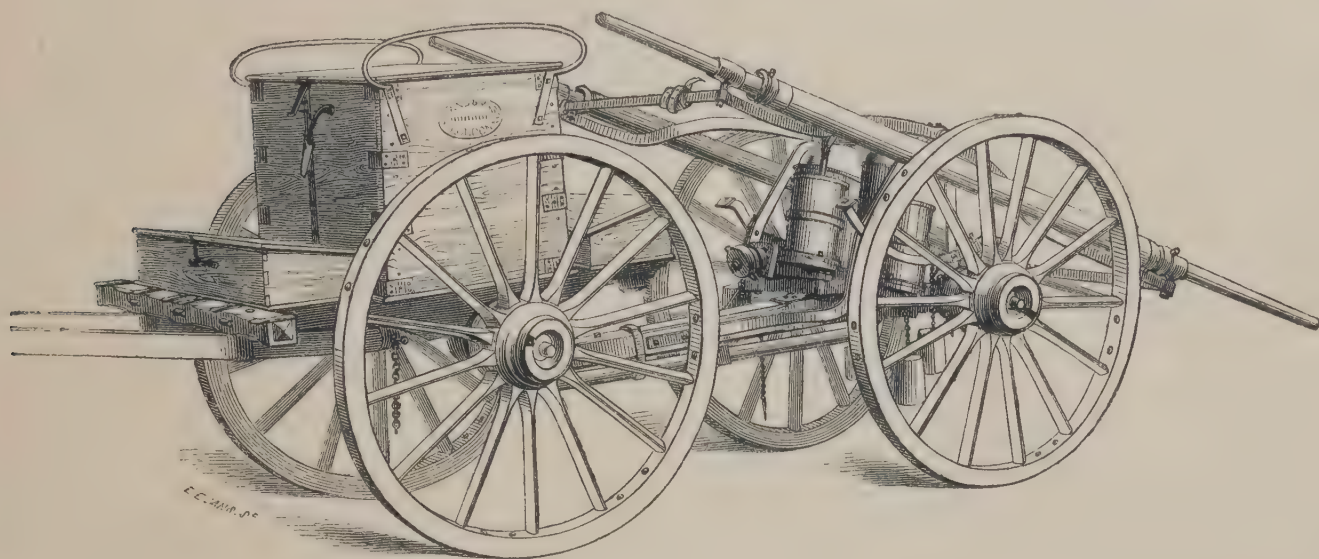


SHAND & MASON'S PATENT STEAM FIRE ENGINE,
as used for several years by the London Fire Engine Establishment.



BRIGADE FIRE ENGINE,
as made by Shand & Mason for the London Fire Engine Establishment.

SHAND & MASON, *continued.*



CAPTAIN FOWKES' PATENT MILITARY FIRE ENGINE,
as made by Shand & Mason for Her Majesty's War Department.

[1991]

SMITH, BROTHERS, & CO., *Hyson Green Works, Nottingham.*—Pressure and vacuum gauges patented by Sydney Smith, Nottingham.

[1992]

SOUL, M. A., 3 *Leadenhall Street.*—Salinometer for steam boilers using salt water (Long's patent).

[1993]

STEER, WILLIAM, *Crossland Street, Nottingham.*—Electro-magnetic engine.

[1994]

STEPHENSON TUBE COMPANY, THE, *Birmingham.*—Seamless locomotive, marine, steam, and other kinds of metal tubes ; calico printing rollers, &c.

[1995]

STONE, JOSIAH, *Deptford, Kent, S.E.*—3-throw ship's pump ; double action ship's fire engines ; portable ship's fire engines.

[1996]

STONES, SETTLE, & WILKINSON, *King Street Brass Works, Hull.*—Brass works for engineers. (*See page 71.*)

[1997]

STRATFORD, WILLIAM, 6 *Edward Street, Mile End Road.*—Patent furnaces and bars. (*See page 72.*)

[1998]

STUBBS, W., 10 *Elliott Street, Liverpool.*—Registering machine for beer taps.

[1999]

STUBBS, WILLIAM, 1 *Union Street, Cleveland Street, Mile End.*—Specimens of coopering in wood, bone, and ivory.

SISSONS & WHITE, *Hull*.—Steam pile driver, simple, practical, economical, easily moved, occupies a small space.



SISSONS AND WHITE'S STEAM PILE DRIVER.

This machine supplies a deficiency which has long been felt, viz.:—something more expeditious and powerful than the common hand engine, and less ponderous and costly than those to which steam has hitherto been applied.

It is easily moved, and by a contrivance in the carriage part, can be transferred to other lines at any angle with great facility; there is also an arrangement for readily altering the incline, to suit the various batters at which piles may have to be driven.

It requires 4 men to work it, and consumes 4 cwt. of coals in 10 hours.

Not least amongst its recommendations are its lightness and smallness of cost, as compared with the heavy and expensive steam drivers hitherto used; and where staging is required the advantages are very great.

The total weight of the driver and boiler is 6 tons, including the ram and mountings, which are 22 cwt.; it ordinarily falls 10 times in a minute, with a 5 ft. lift. The bottom framing of the driver is 7 ft. 3 in. square, and the boiler truck 5 ft. 6 in. square; when in work the two are bolted together, and travel on the same tramway. Its comparative lightness, and the small space it occupies, make it capable of being worked in any position or circumstances in which a common hand machine can be placed, either on land or afloat.

By a different arrangement in the upright framing, piles can be driven in a tideway, down to a depth of 30 ft. below the stage on which the machinery stands, the ram driving quite down to the ground without using a "dolly," the dispensing with which is a great advantage.

It will be perceived from the annexed drawing, that the bottom framing is in two heights—the upper part revolving turntable fashion on the lower one. The machine can thus be faced round to any of the four sides.

The travelling wheels are castors, so that by lifting up each side with a lever the castors can be turned to run on a tramway at any angle.

It is moved by fastening the end of a rope ahead, passing it over a roller under the winch, and taking a turn round the barrel.

The pile is quickly pitched by attaching with a shackle a common chain to the pitched chain.

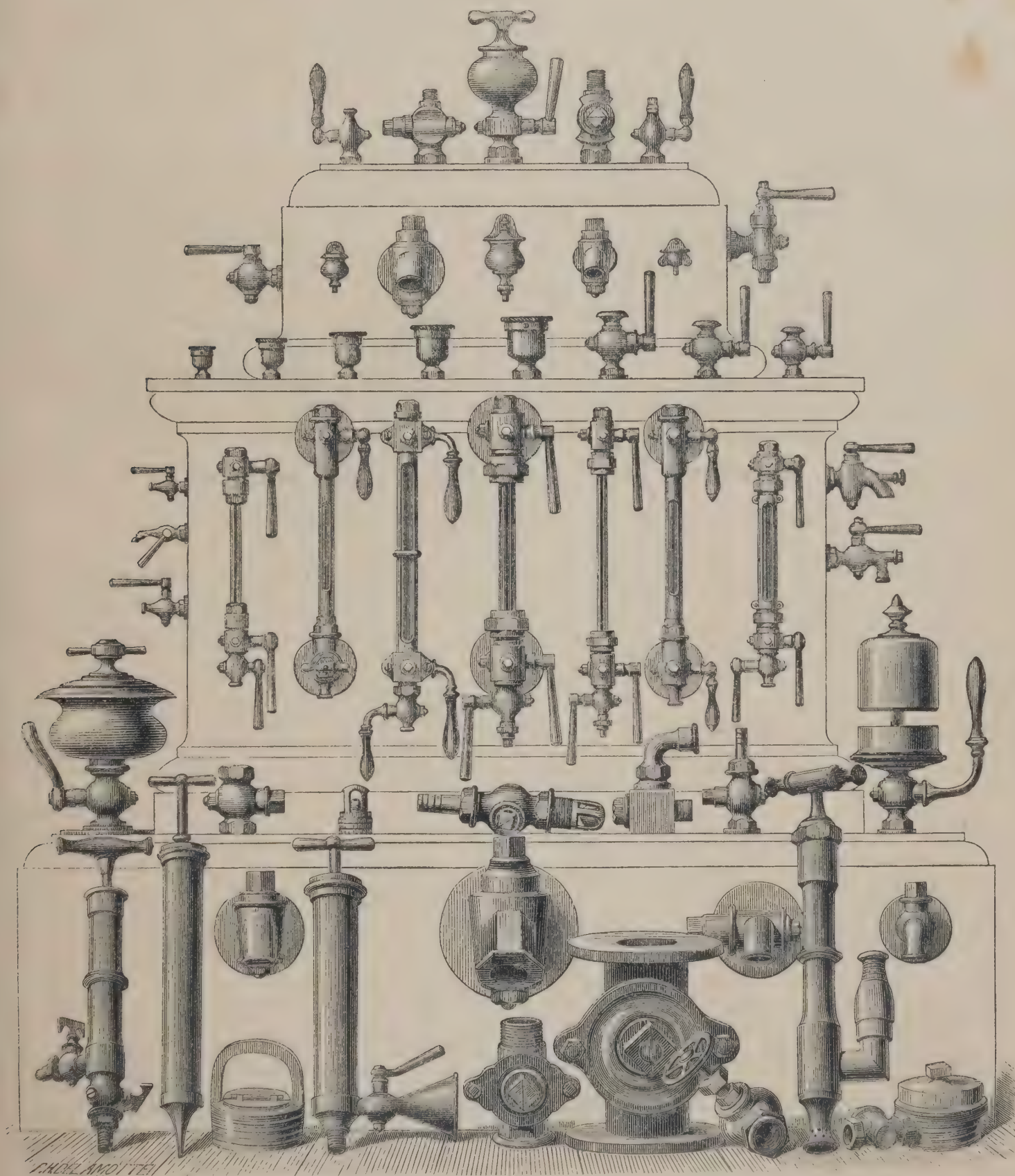
The height of the machine in the annexed drawing is 36 ft. and will pitch a pile 30 ft. long on ground the same level as that on which the machine stands; this height is found to be sufficient for general use, but machines of greater height are made to order.

The ram is lifted by the horns passing through and projecting beyond the back of the upright guide pieces; on this projection is fixed a frame and catches, which lay hold of the shoulder links of the pitched chain in its continuous revolution. The catches are closed by hand, and released, by striking against pins fixed in the back of the guide pieces.

The machine has been worked at the Vernatt's New Sluice, near Spalding; the Harbour Works, Dublin; the North Level Sluice, near Wisbeach; at the Penarth Docks, Cardiff; by Messrs. Smith & Knight, contractors, London; at Messrs. Samuelsons' New Works, Hull; the Jarrow Docks, Newcastle on Tyne, by Messrs. Jackson, Bean and Gow; at the Surrey Canal Docks, Rotherhithe, London, by Messrs. Baker & Son; at the Arsenal, Woolwich, by Mr. Lavers; the new bridge at York; the Bardney Bridge, Lincoln; the Patent Slip, Genoa; at Amsterdam, and several other places.

Extract from a report of a paper on pile driving, read before the Society of Civil Engineers, by Mr. W. F. Bryant, of the Westminster Bridge Works, Dec. 8, 1859:—"Pile driving by steam power was next treated of the author describing some of the principal machines which have been invented, preferring Sissons & White's, as being the most economical and practical useful."

STONES, SETTLE, & WILKINSON, *King Street Brass Works, Hull.*—Brass work for engineers.



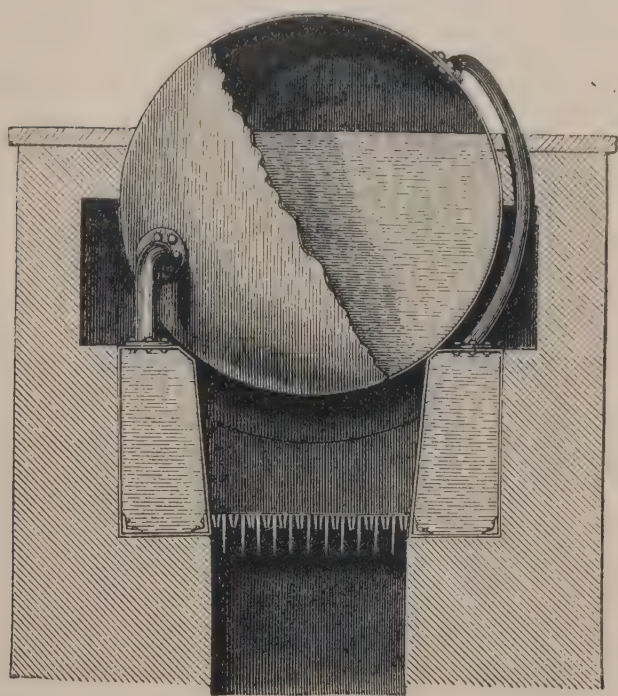
BRASS WORK FOR ENGINEERS.

STONES, SETTLE & WILKINSON exhibit a case of brass goods for steam engines and boilers, viz. : water gauges,

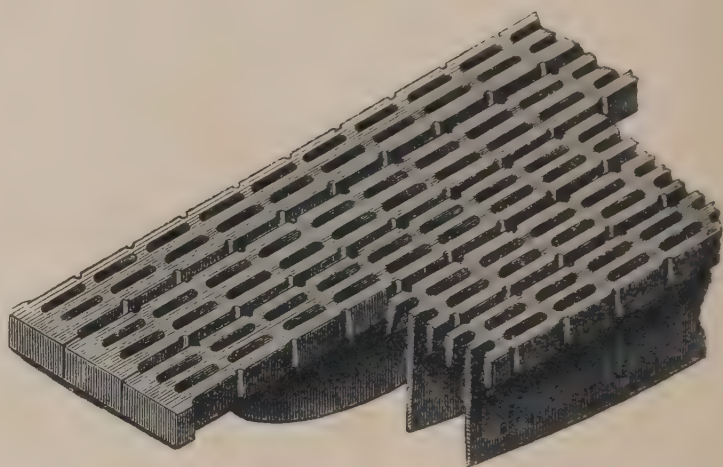
gauge cocks, tallow cups and pumps, oil cups and syringes, steam whistles, steam taps and valves.

Price lists and drawings will be forwarded post-free on application.

STRATFORD, WILLIAM, 6 *Edward Street, Wentworth Road, Mile End Road.*—Patent furnaces and bars.



STRATFORD'S FURNACE AND SECTION OF BOILER.



STRATFORD'S FIRE BARS.

PATENT STEAM-BOILER FURNACE, with patent air-diffusing and smoke-consuming fire bars.

In this furnace, of which the figure is a transverse section, the walls and bridge, instead of being of fire-brick, are formed as water spaces, through which the feed water

is introduced, and is compelled to traverse their entire length before entering the boiler. This, in conjunction with the patent bars shown, effects a great saving of fuel. The same principle is applicable also to various other purposes.

[2000]

SUMMERSCALES, W., & SON, *Coney Lane Mills, Keighley, Yorkshire.*—Brush and dash wheel washing, wringing, and mangling machine. (See page 73.)

[2001]

SYMONS, CYRUS, 2 *George Street, Blackfriars Road, S.E.*—Sewing machine, working with little noise, wear, trouble, or waste.

[2002]

TANGYE, BROTHERS, & PRICE, *Cornwall Works, Birmingham.*—Working model of hydraulic wool and cotton press, and a hydraulic ship jack. (See page 74.)

[2003]

TAPLIN, B. D., & Co., *Traction Engine Works, Lincoln.*—Patent traction engine. (See page 75.)

[2004]

TAYLOR, JAMES, & Co., *Britannia Engine Works and Foundry, Birkenhead.*—Traction engine; steam winch, with deck pumps; model of a steam crane, and of Stephenson's first locomotive.

[2005]

TENNANT, T. M., & Co., *Newington Works, Edinburgh, and Bowershall Iron Works, Leith.*—8-horse power upright portable steam engine; 6-horse power horizontal steam engine. (See pages 76 and 77.)

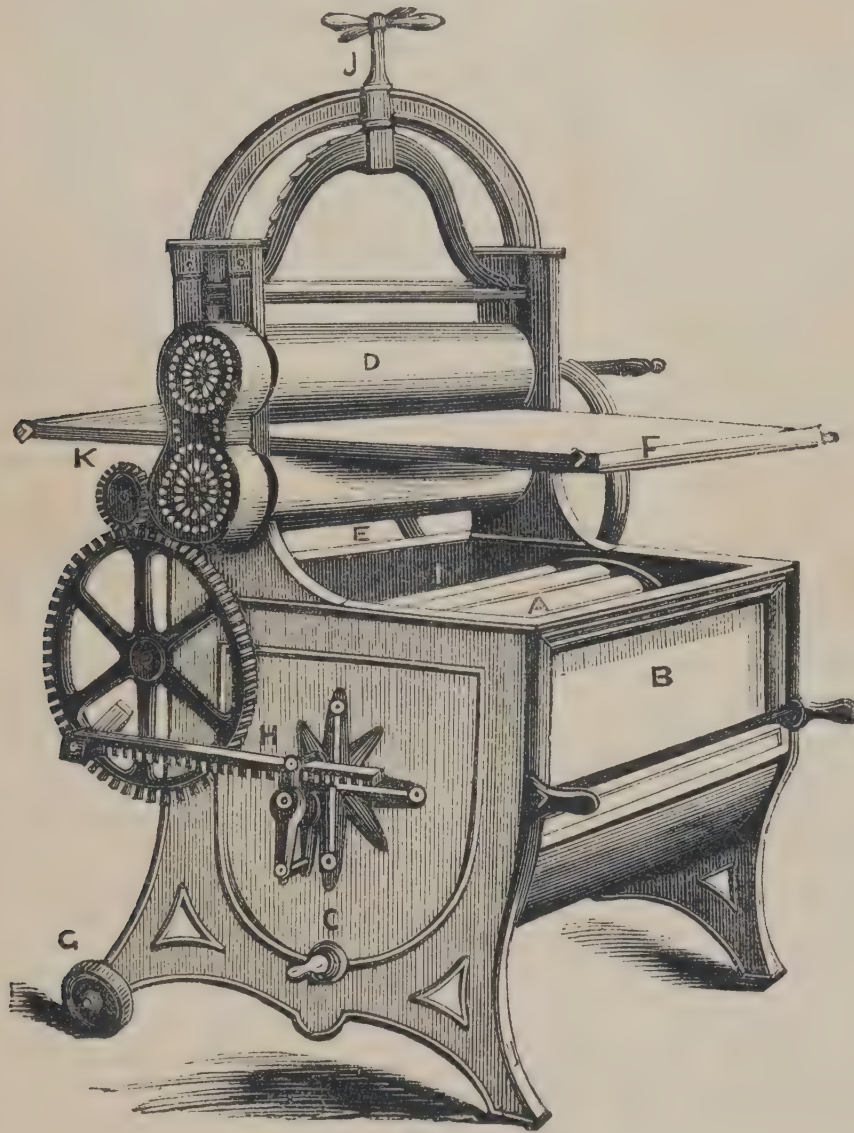
[2006]

THOMPSON & STATHER, *Green Lane, Sculcoates, Hull.*—Hydraulic press pumps.

[2007]

THORNEWILL & WARHAM, *Burton-upon-Trent.*—Pair of winding engines for colliery or other purposes.

SUMMERSCALES, W., & SON, *Coney Lane Mills, Keighley, Yorkshire.*—Brush and dash wheel washing, wringing, and mangling machine.



SUMMERSCALE'S WASHING, WRINGING, AND MANGLING MACHINE.

Obtained the silver medal at the Burnley Agricultural Show, August 30, 1860; also medals and prizes at the following agricultural meetings in 1861, viz.: Keighley, Newcastle-on-Tyne, Brigg, Darlington, Chester, Truro, Oxford, &c.; and the bronze medal at the Agricultural Meeting at Brussels in 1860.

- A* Drum inside of tub.
- B* Tub.
- C* Taps (two) to draw off water.
- D* Sycamore rollers, strongly hooped with iron, and capped with brass hoops.
- E* Drip board to bring the water back into the tub. This is water tight, and no slop whatever need occur.
- F* Mangling cloth, which travels the full length and is taken out when wringing.
- G* Wheels to remove the machine.
- H* Oscillating motion for dash wheel.

I Brushes for very dirty clothes (not used for blankets or flannels), rags, &c.; can be reversed at pleasure.

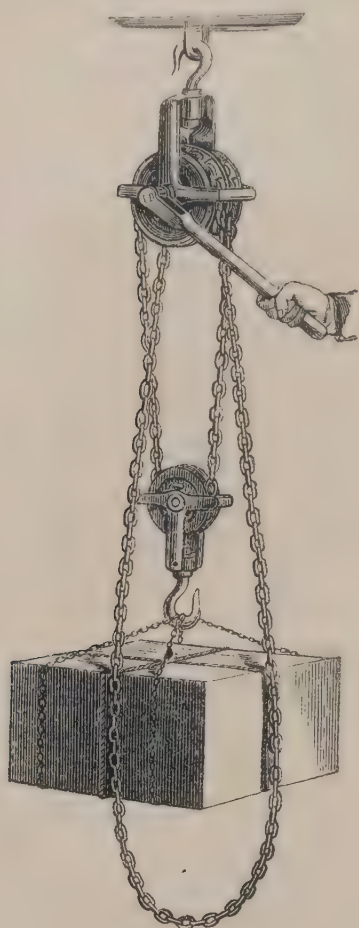
K Wheel thrown out of gear when mangling (in gear when washing).

PATENT COMBINED WASHING, WRINGING, AND MANGLING MACHINE, with a dash wheel or drum inside the tub, made to turn a circle with reversible action, by means of a tooth rack and pinion wheel, which are moved by the fly wheel being always turned in one direction.

The action for washing is thrown out of gear, by lifting a catch and moving the fly wheel shaft horizontally. This being done, the rollers are put into a working position for wringing and mangling. It will be seen on examining the drawing, that there is a mangling cloth attached, which can be put on in a few seconds for mangling. This machine will wash from 10 to 12 shirts at a time. The spring rests upon a patent bar, which increases its power considerably.

Full directions for use are supplied with each machine.

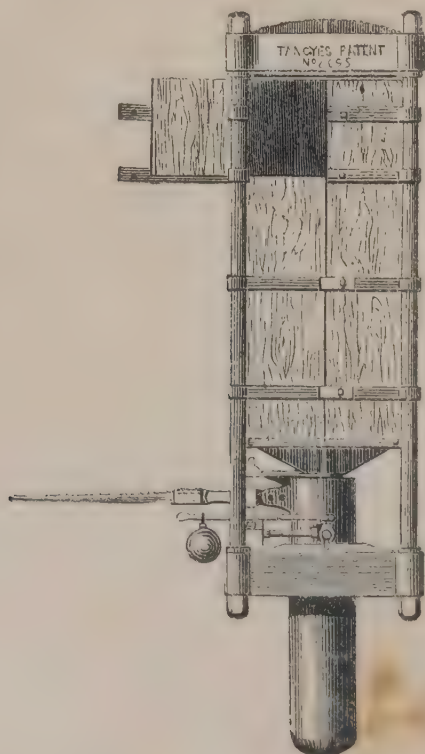
TANGYE, BROTHERS, & PRICE, *Cornwall Works, Birmingham.*—Working model of hydraulic wool and cotton press, and an hydraulic ship jack.



WESTON'S PATENT PULLEY BLOCK. Sizes, to lift $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2 and 3 tons. Prices, from £2 to . . . £5 10
ADVANTAGES.

1. One man can lift the weight specified.
2. The load cannot slip or run back, even if let go suddenly.
3. It requires no hoisting crab.
4. It is cheaper and safer than any other mode of doing the same work, and effects a very great saving in manual labour.

Upwards of 3,000 sets have been sold in about 9 months, and they are now in use in the works of all the leading engineers.

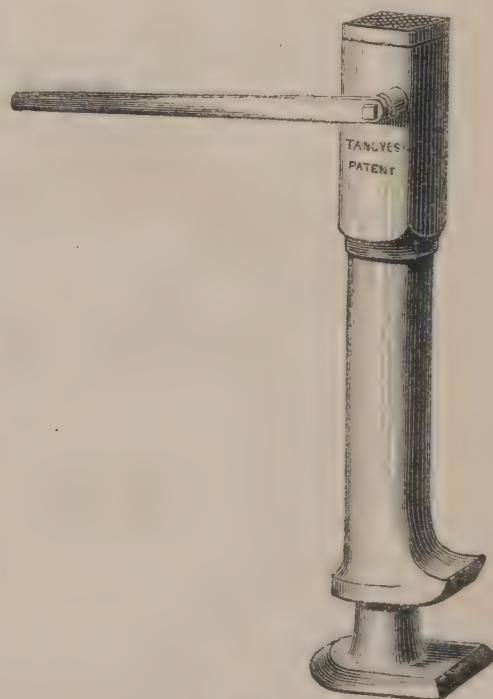


PATENT HYDRAULIC COTTON AND WOOL PRESS. Prices, from £55 to . . . £200 0



SCREW, COTTON, AND WOOL PRESS.

IMPROVED SCREW COTTON AND WOOL PRESS. Prices, from £45 to . . . £150 0



HYDRAULIC LIFTING JACK.

PATENT HYDRAULIC LIFTING JACK.

This jack is safer than any hitherto made, inasmuch as the lowering is under perfect control, being regulated by a screw; the foot and cylinder are also in one forging instead of being screwed together, or with the claw hung loosely over the head, as is the case with all other hydraulic jacks.

The cylinder and ram are made of the very best scrap iron. The prices, also, are as low as any in the trade.

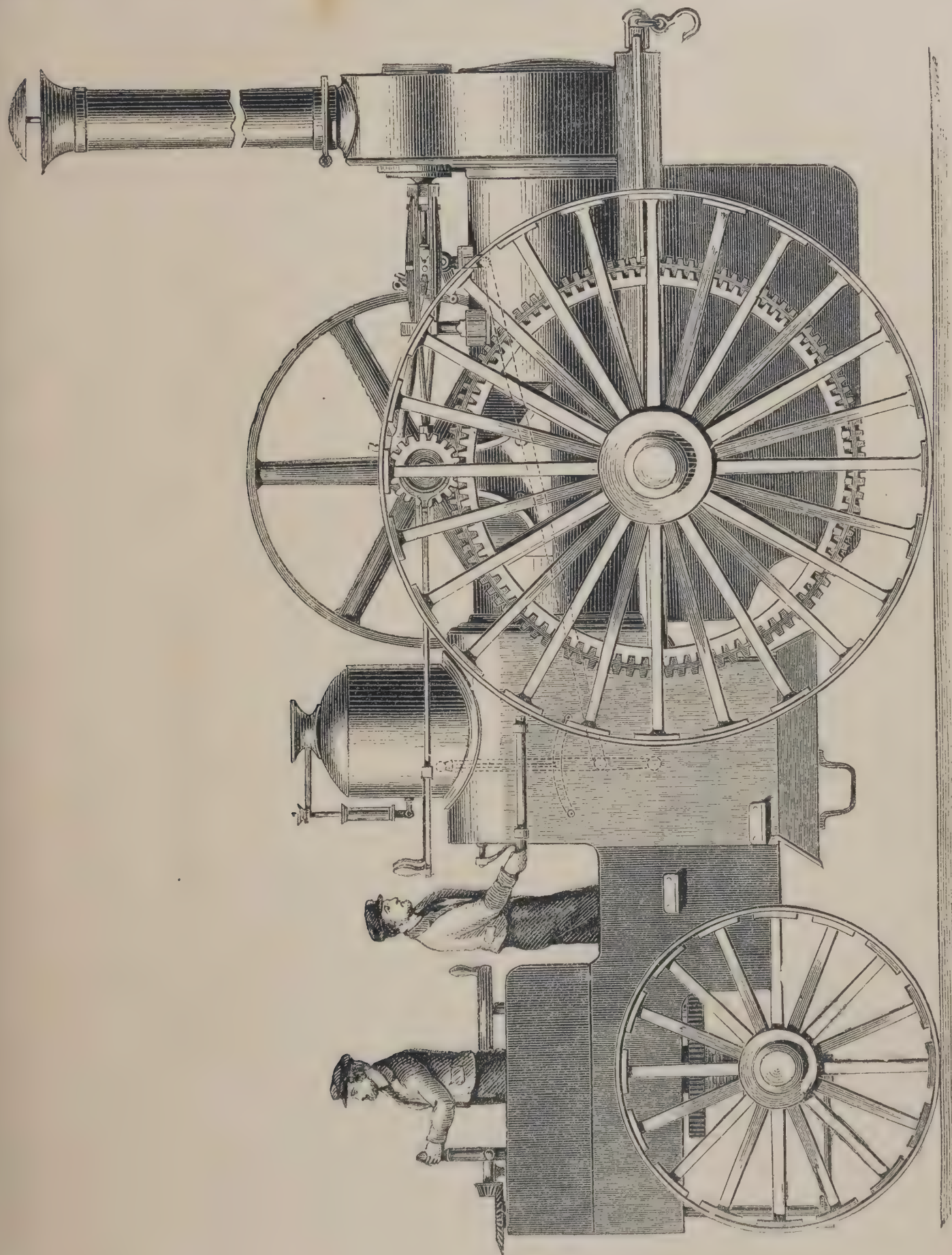
Prices:—

To lift 4 tons .	£8 10	To lift 15 tons .	£18 1
ditto 6 do. .	10 10	ditto 20 do. .	22 1
ditto 8 do. .	12 0	ditto 30 do. .	25 1
ditto 10 do. .	15 0	ditto 40 do. .	27 1
ditto 12 do. .	16 10	ditto 50 do. .	32 1

Sole London agents for the sale of Weston's patent pulley blocks, S. & E. Ransome & Co. 31, Essex Street Strand.

Sole London agent for general machinery, Mr. Holman, 18, Cannon Street, E.C.

TAPLIN, B. D., & Co., *Traction Engine Works, Lincoln.*—Patent traction engine.



B. D. TAPLIN AND CO.'S NEW PATENT TRACTION ENGINE.

The above illustration represents one of B. D. TAPLIN & Co.'s TRACTION ENGINES of 16-horse power, with double cylinders and all the latest improvements: comprising their patent traction gear, also raising and lowering apparatus for regulating the height of water, when travelling up or down hill, or on irregular roads. The mode of steering is simple and effective.

The above engine is fitted with extra space for water and coals, sufficient for a 10 miles journey; and is built expressly for drawing heavy loads of 50 tons and upwards. It is suitable for Government works, contractors at home and abroad, mill, mine, and quarry

owners, or for any other purpose requiring immense steam power.

Price £590 0

Further particulars sent post-free on application to B. D. Taplin & Co.'s traction engine works, Lincoln.

A 12-HORSE POWER ENGINE made on the same principle for farming purposes, such as steam ploughing, thrashing, grinding, sawing, &c. Price £425 0

Prices and particulars quoted for traction engines up to 50-horse power; and also for waggons for contractors' purposes suitable for traction engines.

TENNANT, T. M., & Co., *Newington Works, Edinburgh, and Bovershall Iron Works, Leith.*—8-horse power upright portable steam engine ; 6-horse power horizontal steam engine.

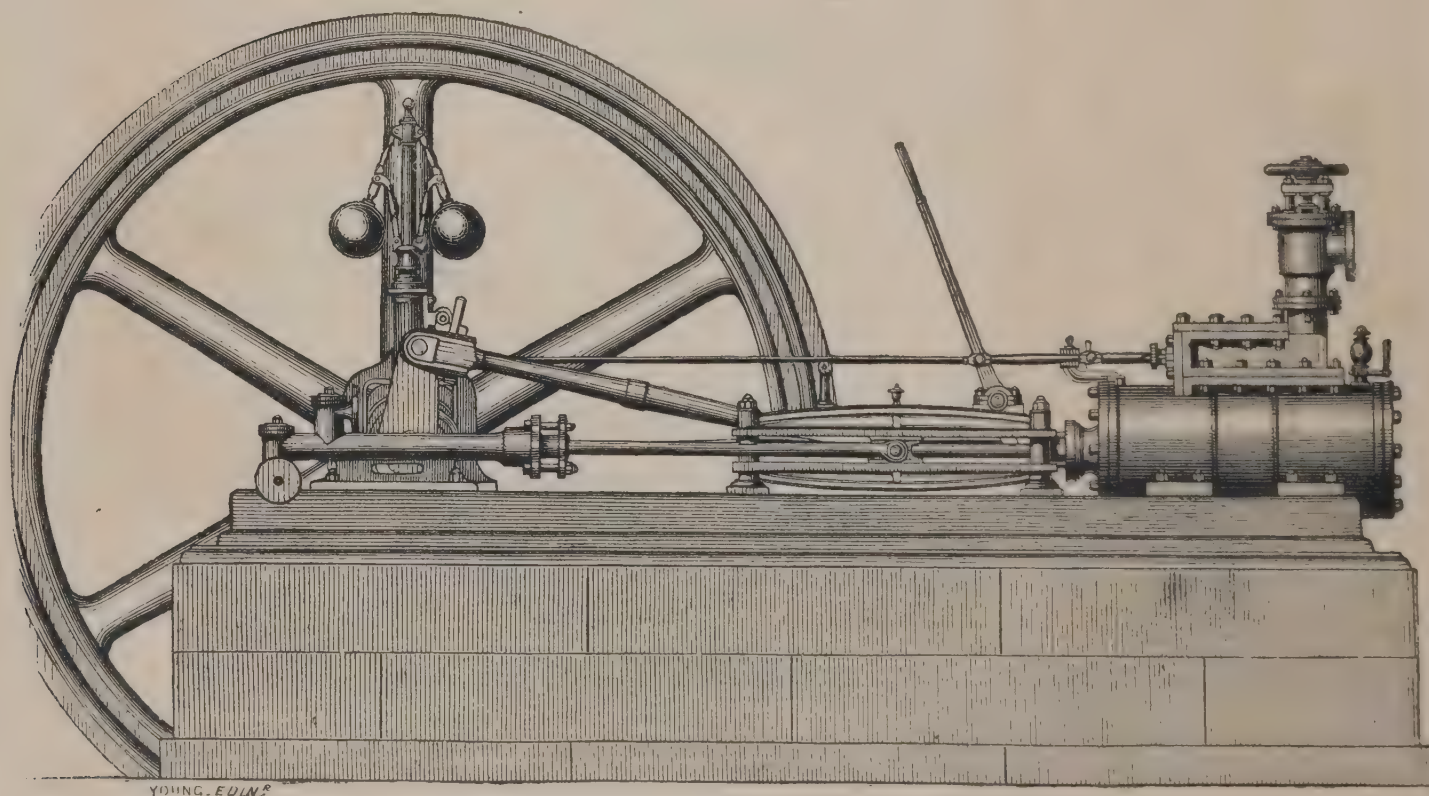
Elevation of 6-HORSE POWER HIGH-PRESSURE HORIZONTAL STEAM ENGINE, 8½ in. cylinder, 20 in. stroke.

Price £60 0

Prices, with large tubular boiler and connexions, complete :—

3-horse power	£50
4 ditto	80
6 ditto	110
8 ditto	144
10 ditto	170
12 ditto	198
14 ditto	224
16 ditto	248

18-horse power	£275
20 ditto	300
25 ditto	375
30 ditto	450
35 ditto	490
40 ditto	520
45 ditto	585
50 ditto	650
60 ditto	800
70 ditto	950
80 ditto	1,150
90 ditto	1,300
100 ditto	1,500
120 ditto	1,800
140 ditto	2,200
150 ditto	2,400



HIGH-PRESSURE HORIZONTAL STEAM ENGINE.

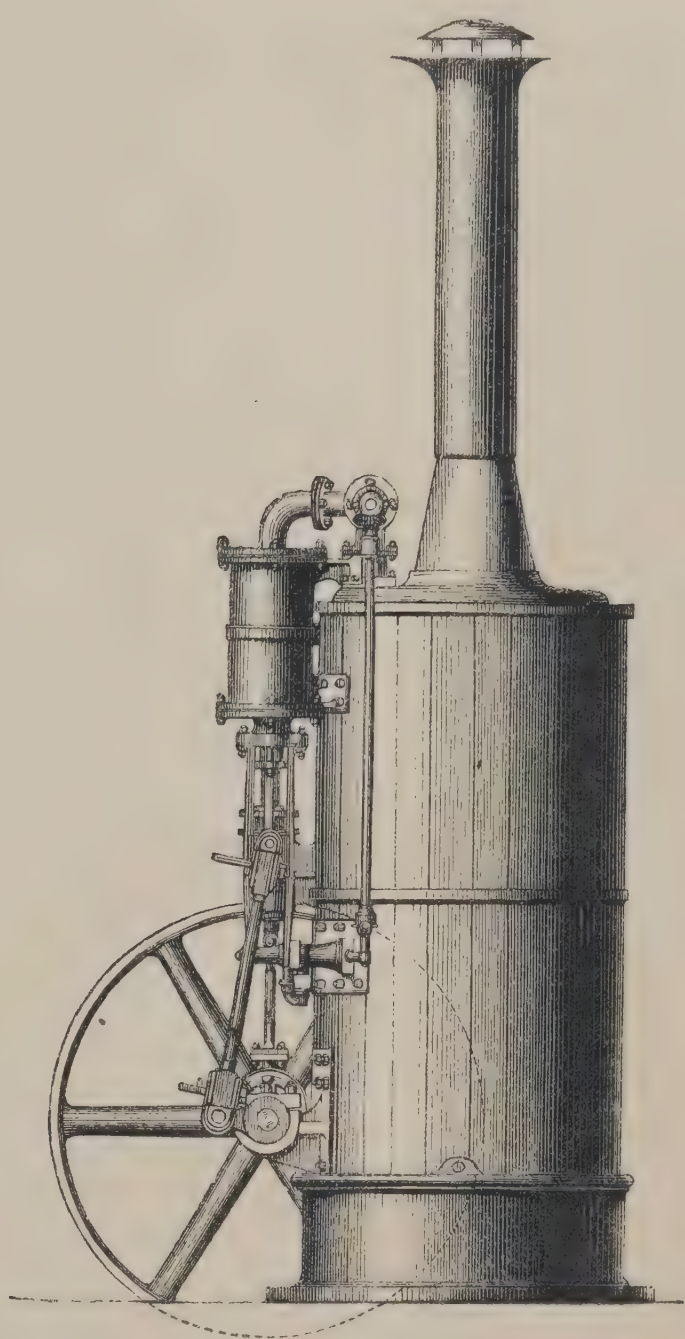
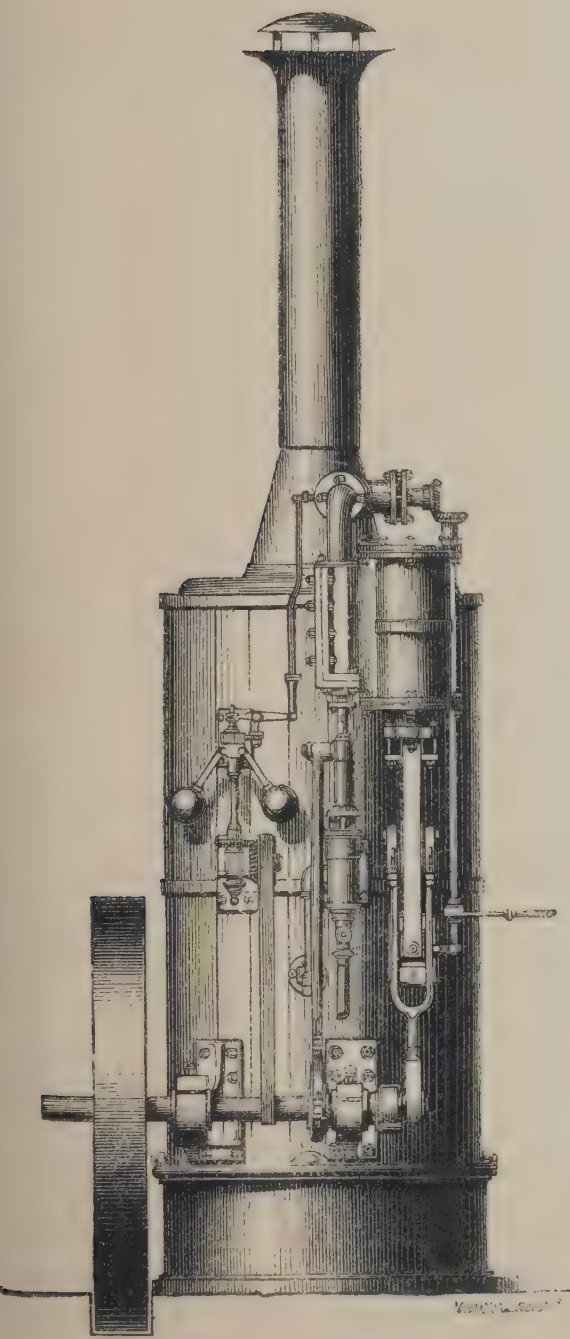
COMBINED HIGH AND LOW PRESSURE HORIZONTAL STEAM ENGINES, from 20-horse power upwards.

COMBINED HIGH AND LOW PRESSURE HORIZONTAL BEAM, up to 250-horse power.

LOCOMOTIVE ENGINES, from 9½ in. cylinder upwards water wheels and turbines ; sugar, corn, saw, oil, and bone mills.

Designs and estimates prepared for machinery for home and foreign use.

TENNANT, T. M., & Co., *continued.*



UPRIGHT STATIONARY STEAM ENGINE.

EIGHT-HORSE POWER UPRIGHT STATIONARY STEAM					
ENGINE, requiring no building-in, with large multi-					
tubular boiler, constructed to burn wood, or inferior					
coal, occupying a space 6 ft. by 5 ft. Price . . £160					
4-horse power,	6½ in. cyl.	13 in. stroke	. £105		
6 ditto	8 ditto	14 ditto	. . 130		
8 ditto	8¾ ditto	16 ditto	. . 160		
10 ditto	9½ ditto	16 ditto	. . 190		
12-horse power	2 ft. 8 ditto	14 ditto	. . 230		
14 ditto	2 ft. 8¼ ditto	16 ditto	. . 250		
16 ditto	2 ft. 8¾ ditto	16 ditto	. . 275		
20 ditto	2 ft. 9½ ditto	16 ditto	. . 320		

The above engines made portable on carriages and wheels, 10 per cent. extra.

PORTABLE STEAM CRANES, for wharf or railway, with above engines on wrought-iron carriage, pillar and jib, to hoist, lower, and turn round by steam.	
To hoist 30 cwt.	£180
„ 40 cwt.	210
„ 60 cwt.	260
„ 80 cwt.	350
TRACTION OR ROADWAY ENGINES, with coal and water tanks, and steering apparatus complete :—	
10-horse power.	£300
12 ditto	360
15 ditto	450
20 ditto	580

[2008]

TIZARD, WILLIAM LITTELL, 12 *Mark Lane, London*.—A surface refrigerator; an improved octuple fermenting apparatus; a suspension barrel washing machine.

[2009]

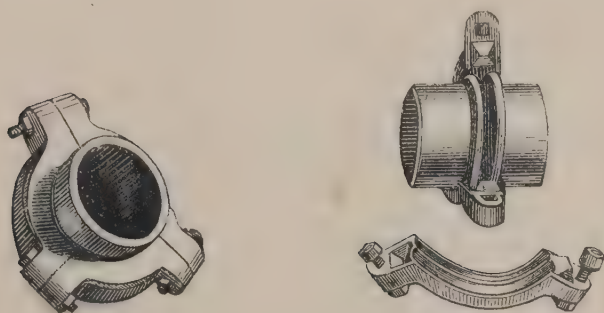
TOD & Mc GREGOR, *Glasgow*.—A pair of direct acting inverted cylinder marine engines.

[2010]

TOPHAM, CHARLES, 31 *Bush Lane, E.C.*—Smith's patent self-expanding apparatus for cleaning tubular boilers.

[2011]

TRUSS, T. S., 53 *Gracchurch Street, London*.—Patent elastic joint for gas and water pipes.



ELASTIC JOINTS FOR GAS AND WATER PIPES.

These joints, which are simple and economical, provide for the expansion and contraction of the metal, the deflection to which continuous lengths of piping are liable, and the easy removal or insertion of pipes, without cutting or otherwise damaging either pipes or joints.

These joints have been tested to a pressure of 1,000 ft. of water; and are now applied to gas and water mains in England and on the Continent, varying from 2 in. to 4 ft. in bore.

They are also extensively in use for hot-water apparatus.

[2012]

TYLER, HAYWARD, & Co., 85 *Upper Whitecross Street*.—Soda-water machine, presses, well-engine, lift-pump, engine fittings.

The prices of manufactures exhibited by Hayward. Tyler, & Co. are subjoined:—

No. 1. Patent beam soda-water engine, to make 200 doz. per diem	£75 0
No. 2. Patent beam soda-water engine, to make 150 doz. per diem	70 0
No. 3. Patent beam soda-water engine, to make 100 doz. per diem	65 0
No. 1. Bramah's original soda-water machine to make 200 doz. per diem	£65 0
No. 2. Bramah's original soda-water machine to make 150 doz. per diem	60 0
No. 3. Bramah's original soda-water machine to make 100 doz. per diem	55 0

A 5-in. hydraulic press for tinctures, &c.	60 0
Press for proving girders	35 0
Naylor's pressure gauge in mahogany case	16 10
A fire or manure pump, on wheels, with two 3½ inch barrels	7 0

Lift and force pumps on planks:—

	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.
Best	80/0	107/6	126/0	147/0	168/0	234/0
Good	74/0	85/0	105/0	127/6	147/6	
Common.	60/0	68/6	87/6	107/6	127/6	

For engine fittings, see price list issued by H. T. & Co. which, with price lists of all their manufactures, will be sent post-free on application.

[2013]

TYLOR, J., & SONS, *Warwick Lane, Newgate Street, London*.—Pumps, fire engines, steam fittings. (See page 80.)

[2014]

WALKER, THOMAS, & SON, 58 *Oxford Street, Birmingham*.—Steam boiler, alarm water gauges, and other machinery.

[2015]

WARD, F. O., *Hertford Street, Mayfair*.—Horizontal steam engine, combined with double-acting hydraulic power pumps, on cistern bed—new principle. (*See page 81.*)

[2016]

WARNER, JOHN, & SONS, *Crescent, Cripplegate, London*.—Water wheels, irrigators, ship manure pumps, fire engines. (*See page 82.*)

[2017]

WEBB & SON, *Comb's Tannery, Stowmarket, Suffolk*; *London office, 11 Leadenhall Street*, Mr. R. Pearce, Manager.—Leather; machine bands, buckets, and hose; glovers' leather, &c.

These machine bands are cut from level, and carefully selected oak-bark tanned English hides, and are manufactured throughout, to ensure a strength and durability which proves most satisfactory in all climates. The workmanship in single, double, and edged bands, is of the strongest description, and well adapted for heavy work. They are all thoroughly stretched by powerful machinery.

Considering the quality and price, these are the cheapest bands now manufactured.

The leather hose, buckets, rope, and thongs, are all of the best description.

The sole butts, glove and gaiter leather, calf skins and horse hides, both rough and dressed, with many other descriptions of leather, are tanned and manufactured upon the most improved principles by the exhibitors, who will forward prices and full particulars on application.

[2018]

WEIR, E., 142 *High Holborn*.—Washing, wringing, and mangling machines; cinder lifter, bread kneader.

[2019]

WENHAM, F. H., 1 *Union Road, Clapham Rise, S.*—A 10-horse power thermo-expansion steam engine, superheating the steam between the cylinders.

[2020]

WESTON, THOMAS ALDRIDGE, 31 *Essex Street, Strand, London*.—Improved pulley block and lifting apparatus.

[2021]

WHITE, JOSEPH, 7 *Trinity Street, Southwark, London, S.E.*—12 spring lever valve engine oil feeders, &c. (*See page 83.*)

[2022]

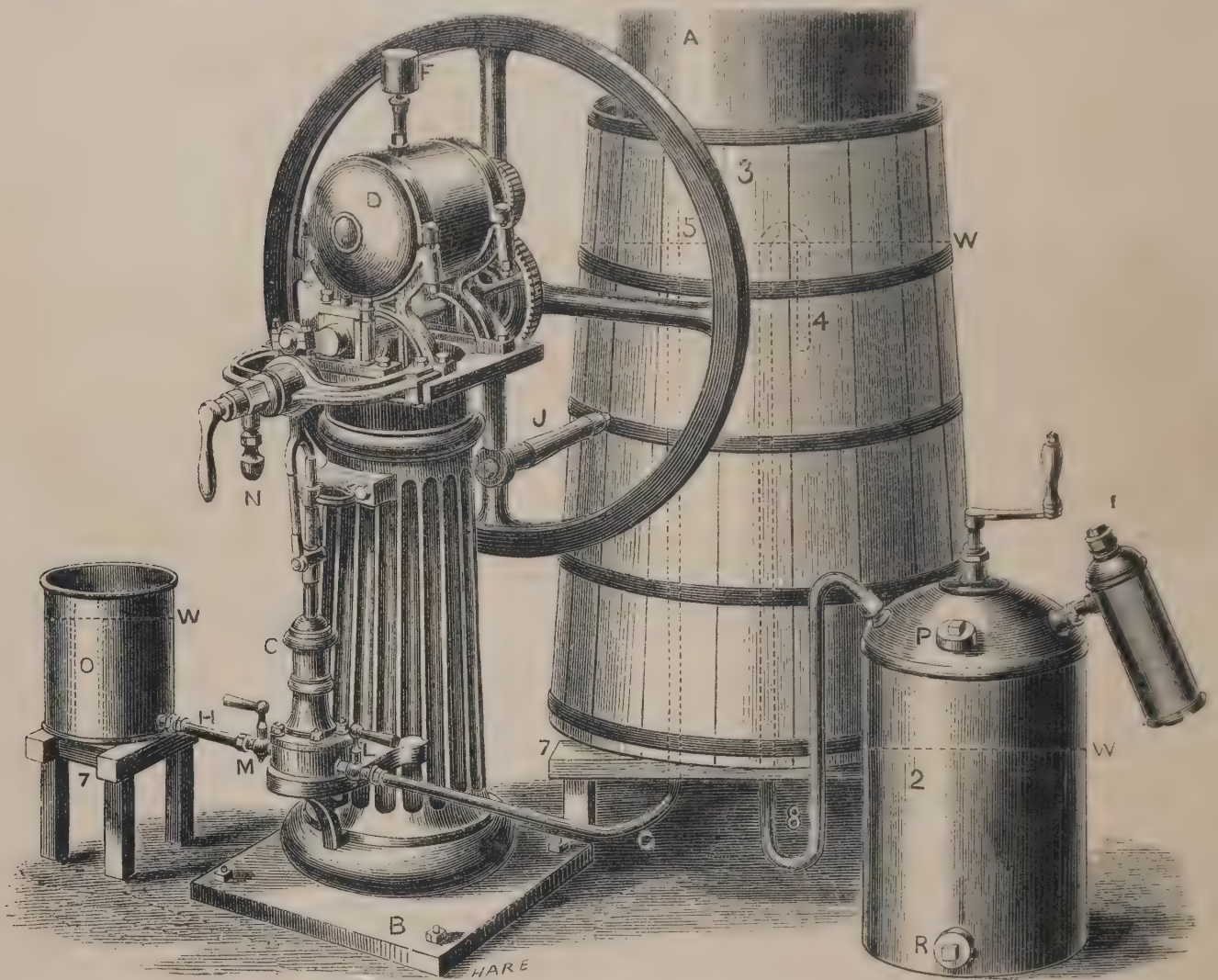
WHITMEE, JOHN, & Co., 70 *St. John Street, Clerkenwell, E.C.*—Crushers, cutters, mills and machines; Jolley's American provision safes, and refrigerators.

[2023]

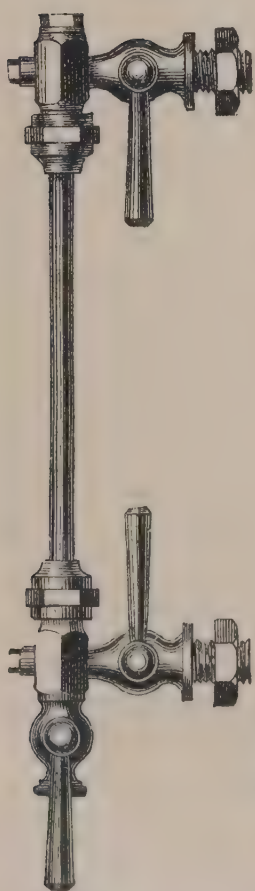
WHITMORE & SONS, *Wickham Market, Suffolk*.—Improved steam engine; corn-mill machinery; engine details; framed drawings. (*See pages 84 and 85.*)

TYLOR, J., & SONS, *Warwick Lane, Newgate Street, London.*—Pumps, fire engines, steam fittings, soda-water machines, &c.

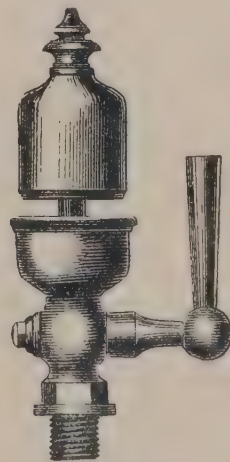
Obtained the Prize Medal, Great Exhibition, 1851 ; Dublin, 1853 ; and Paris, 1855.



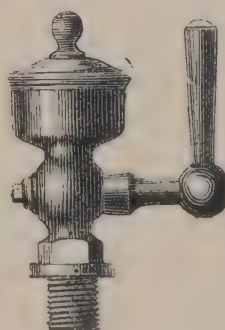
J. TYLOR AND SON'S PATENT SODA-WATER MACHINES TO MAKE FROM 50 TO 360 DOZ. PER DIEM.



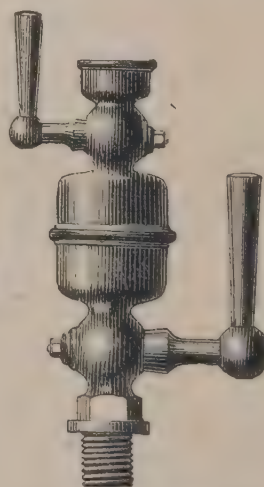
WATER GAUGE.



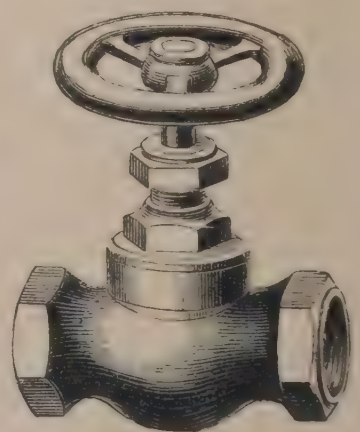
STEAM WHISTLE.



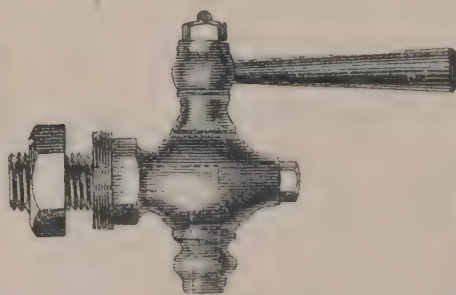
GREASE CUP
WITH COCK AND
COVER.



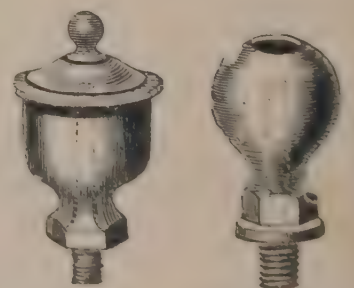
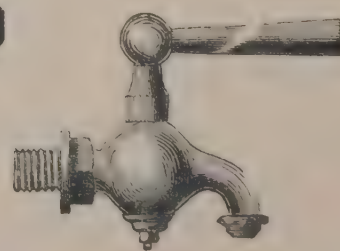
DOUBLE GREASE CUP.



GUN-METAL STOP VALVES.



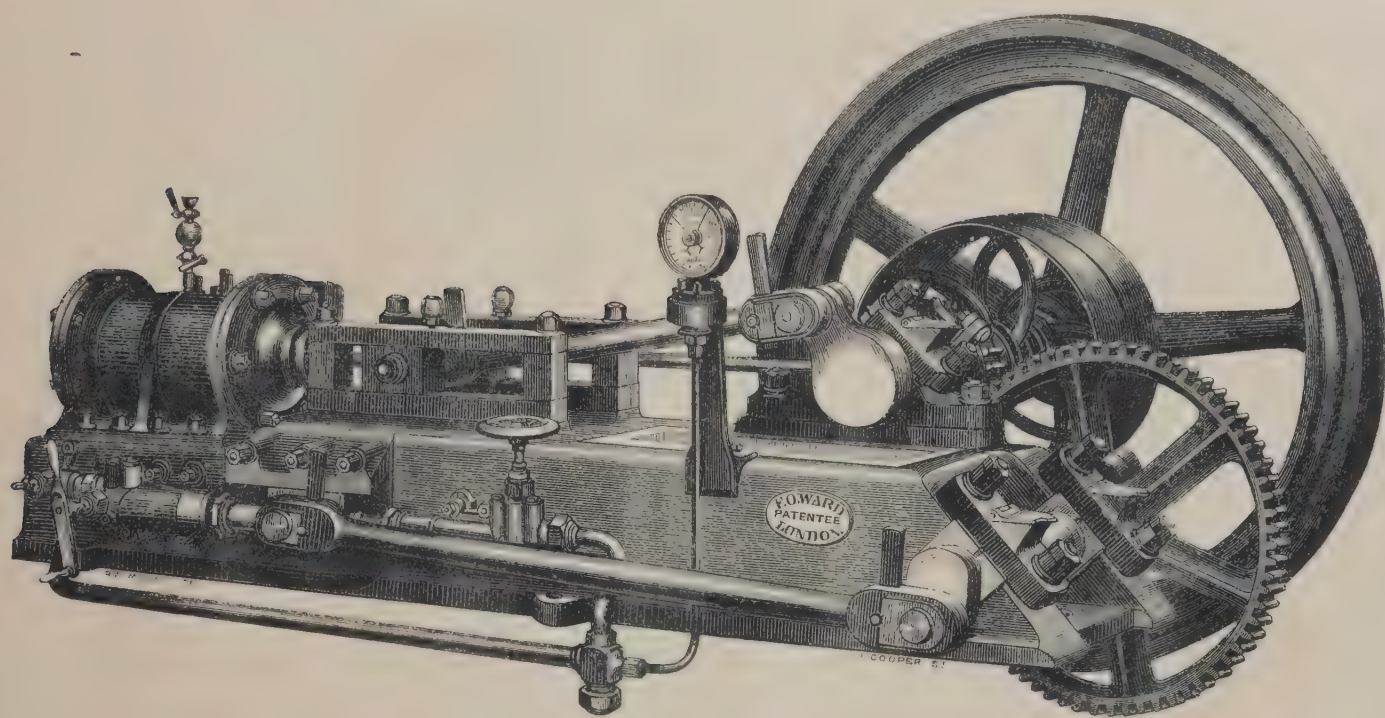
GAUGE COCKS.



SYPHON LUBRICATORS.

Illustrated catalogues of steam engine and boiler fittings may be obtained post-free by application to J. Tylor & Sons, also catalogues of every description of brasswork for merchants, architects, builders, engineers, and plumbers.

WARD, F. O., *Hertford Street, Mayfair.*—Horizontal steam engine, combined with double-acting hydraulic power pumps, on cistern bed—new system.



F. O. WARD'S PATENT IMPROVED HYDRAULIC PUMPING ENGINE.

This machine consists of a steam engine and four power pumps, horizontally disposed, the former on the top, the latter on the sides, of an elongated hollow bed, arranged to serve also as a cistern. The pumps are of a peculiar construction, which will be presently explained. Their disposition is such as to admit of a considerable increase of their length beyond that of ordinary hydraulic pumps, as will also be shown. They are worked on a plan believed to be novel and advantageous. The four pumps are coupled together in pairs, and the plungers of each pair are attached to the opposite ends of an intervening slide. This slide is moved to and fro, between horizontal guides, by one end of a connecting rod, whose opposite extremity is actuated by the crank of a driving shaft, transversely disposed across the oblique end of the cistern.

These arrangements are shown in the figure, which also exhibits the spur wheel and pinion, geared at 3 to 1, by which the pump-driving shaft just mentioned derives motion from the steam-engine shaft. The peculiar grouping of these parts upon and around the cistern is such, it will be observed, as virtually to compress two machines within the area which either would occupy alone. This valuable economy of floor space is effected by the super-position of the steam engine above the pumps; yet it is not purchased (as might be expected) by any addition to the height of the machine, which could not conveniently be diminished, even were the pumps away.

To this advantage of compactness that of lightness is added, since the same casting which serves as bed-plate for the steam engine, affords also a stiff framing to the pumps, besides answering as water cistern for their supply. One casting thus replaces three; and yet, compact as it is, its elongated form affords scope for a connecting rod of unusual length. This is a considerable advantage, enabling, as it does, pumps of increased length, to be worked with undiminished directness of thrust.

The economy hence resulting, in costly wrought-iron and brass work, is very great. For, on each side of the machine, one crank and one connecting rod are made to drive two long pumps, each equal in power to at least three ordinary short pumps, every one of which, on the old plan, would require a separate crank and connecting rod of its own.

We have therefore ten cranks and ten connecting rods saved out of twelve, and four sets of pump valves doing

the work of twelve, with all the collateral advantages implied in these large economies. Thus, to take one example—whereas every set of six pumps on the old plan requires a costly 6-throw crank-shaft to work it, four long pumps, equal in power to two such sets, are driven on the new plan by one cheap, straight shaft, carrying one plain crank at each end.

Nor does this diminution in the number of cranks involve a less equable distribution of the resistance, seeing that the two cranks employed are set in such angular relation to each other, that when one pair of pumps is at dead-point, the other is at mid-stroke, and *vice versa*.

With reference to power, indeed, it is beyond doubt that the gearing, which in this machine applies three rapid engine strokes to produce one slow pump stroke, brings power to bear against resistance far more advantageously, than when (as in certain direct-acting hydraulic pumps recently introduced) steam and water are made to travel at equal speed.

The remaining peculiarities relate chiefly to the internal fitting of the pumps. These have their inlet and outlet valves placed at one end, instead of, as usual, at opposite ends of the barrel. The water, therefore, enters and quits the pump at the same end, so that the annular water-way heretofore left between the plunger and barrel, ceases to be requisite. The plunger is accordingly turned to fit the barrel, so that no cavity remains to harbour air as usual, to the detriment of the vacuum or suction power of the pump, of which no less than one-third is sacrificed by the ordinary disposition of these parts. As to back-slip, or the reflux of water through the valves during their fall, this must needs be small in an engine having three times fewer than the ordinary number of valves, each making three times fewer than the usual number of lifts.

To sum up—this pumping engine, taken as a whole, is believed to present a series of advantages not heretofore combined in any one machine of its class. Its parts are few, simple, and light, easy and cheap to make and fit, in disposition singularly compact, in action very direct and efficient.

Though specially designed to work hydraulic presses, this engine is equally available, with slight modifications, for other kinds of pumping work. It may be obtained of Messrs. Wren & Hopkinson, machinists, Manchester; who are appointed manufacturers under the patent.

WARNER, JOHN, & SONS, *Crescent, Cripplegate, London.*—Water wheels, irrigators, ship pumps, manure pumps, fire engines.

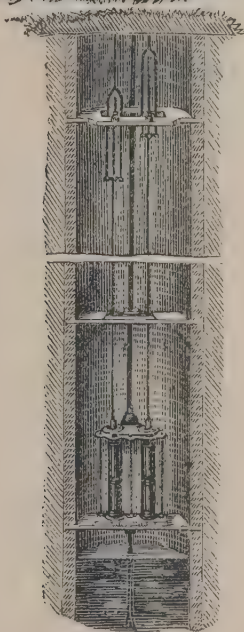
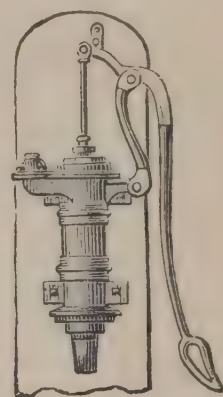
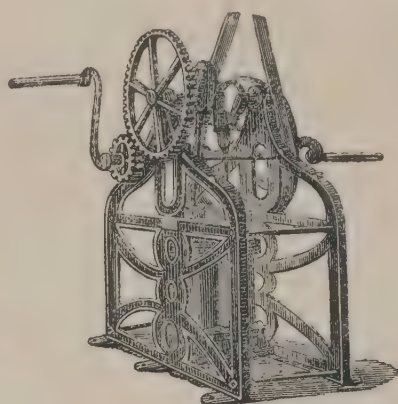
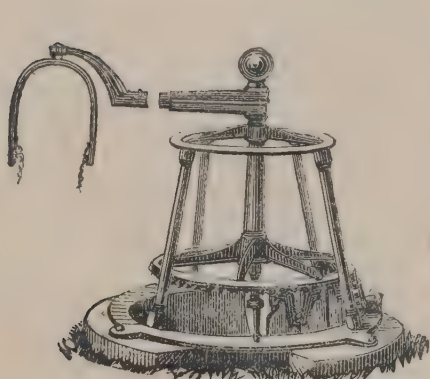
Obtained the Prize Medal in 1851.

The exhibitors are hydraulic engineers and manufacturers of fire engines, ship pumps, patent brass and iron pumps, garden engines, lamps, urns, braziers goods, plumbers' work, water-closets, steam and gas cocks, lead, tin, and copper pipe, imperial standard weights and measures.

Illustrated and priced catalogues can be had upon application.

No. 2 B. METHOD OF RAISING WATER from wells 50 to 200 ft. in depth by means of Warner's horse wheel frame and treble barrel pumps.

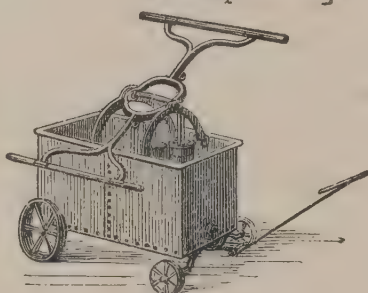
No. 13½. HYDRAULIC ENGINE for working pumps by steam power. Suitable for wells from 200 to 300 ft. in depth, or where a large quantity of water is required.



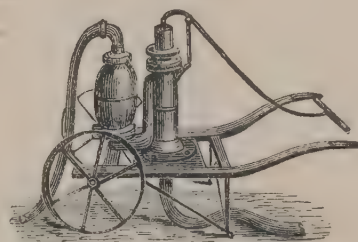
No. 2 B.

No. 13½.

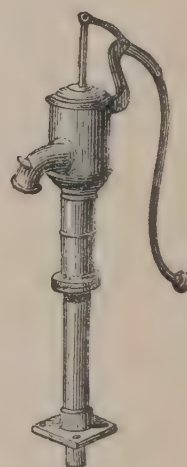
No. 69.



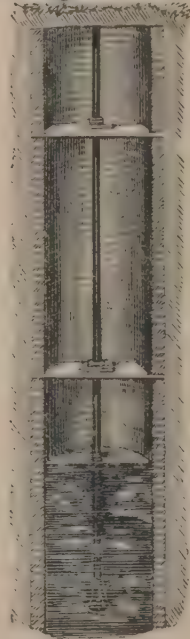
No. 573.



No. 39½.



No. 35.



No. 11.

No. 11. FRAME AND PUMP for supplying the upper stories of houses from wells not exceeding 28 ft. in depth; to be worked by one man, or by steam power.

shipment abroad. This engine can also be used as an effective fire engine.

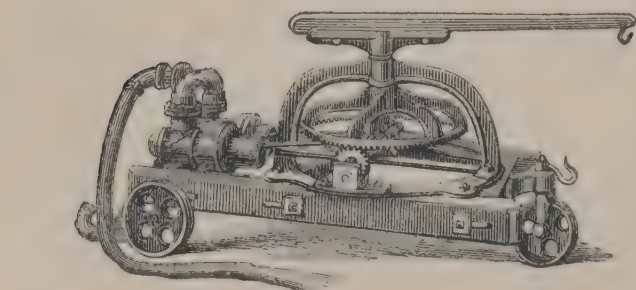
No. 573. WARNER'S PORTABLE FIRE ENGINE. Six men will throw 25 gallons of water per minute, to an altitude of 50 ft. It is particularly recommended for mansions, factories, and all large establishments.

No. 69. WARNER'S PATENT BRASS, VIBRATING STANDARD, LIFT AND FORCE PUMP, on wood plank. Recommended for its simplicity of construction and lowness of price.

No. 35. WARNER'S PATENT CAST-IRON LIFT PUMP for wells not exceeding 25 ft. in length.

No. 39½. WARNER'S DOUBLE-ACTION PUMP for raising and forcing water or liquid manure. This pump forms an effective fire engine for two men. The power required to work pumps on this principle, is only half that required by those of ordinary construction.

Brass and iron pumps of different sizes, and various patterns, are always kept in stock by John Warner & Sons.



No. 5½.

No. 5½. WARNER'S FARM OR PLANTATION IRRIGATOR, mounted on a strong frame, will, with 1 horse, force upwards of 6,000 gallons per hour of water or liquid manure over the land, even at a high level. From its simple construction it is particularly adapted for

WHITE, JOSEPH, 7 *Trinity Street, Southwark, London, S.E.*—12 spring lever valve engine oil feeders; 6 syphon machine ditto; 6 pyramid atmospheric ditto; 1 self-cleansing and filtering cistern; 3 improved filters; specimens of machine bands, laces, and spiral lathe bands.



The IMPROVED SPRING LEVER VALVE OIL FEEDERS are extensively used by engineers and others for lubricating engines and machinery; and they are well adapted for filling oil lamps, both in private houses and on board ships, being unsurpassed for their lightness, strength, and durability. They are also very cleanly, and greatly economise time and oil, as not a single drop can escape except the air valve be pressed by the person using them, and they cost but a trifle more than the common oil can.

Price 16/6, 18/6, 20/6, 22/6, 25/0, 27/6, 31/6 per doz. LAMP FEEDERS.

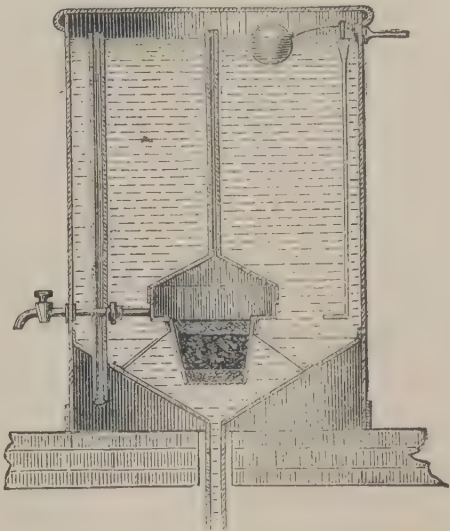
Pints, 2/6; 1½ pint, 3/0; quarts, 3/6 each. WHITE'S IMPROVED SYPHON MACHINE OIL FEEDERS run more freely, and will not spill if upset; can be regulated from a large stream to the smallest drop, and the waste oil returns into the can.

Price 15/0, 18/0, 21/0, 22/6, 25/0, 30/0 per doz. WHITE'S IMPROVED PYRAMID ATMOSPHERIC OIL FEEDERS.

Price 5/0, 6/6, 7/6, 9/0, 10/6, 12/6 per doz. The B. H. CROWN LEATHER DRIVING BAND (Preller's Patent Leather Company, manufacturers,) are one-third thinner, stronger, and lighter than tanned leather, and will work double the time of any others before requiring repairs.

WHITE'S B. H. CROWN LEATHER SPIRAL LATHE BANDS are far superior to catgut or any other material; they will not slip, and can be lengthened or shortened at pleasure.

WHITE'S LEFT-HANDED COUPLING HOOKS AND EYES for 3-stranded gut, leather, or rope bands.



The SELF CLEANSING AND FILTERING CISTERN for household and manufacturing purposes (Rae's Patent). —T. W. Cowan, Kent Iron Works, Greenwich, manufacturer.

The cisterns complete in every respect from £2 upwards.

By the use of these cisterns the water drawn off for household purposes is always pure, the sediment being washed to the apex of the cone, whence it is drawn off. The water for culinary purposes passes upwards through the filter, and from thence to the kitchen. The cistern is washed by a suitable arrangement every time the water comes in from the main, effecting a saving of the pecuniary outlay attending the cleansing of the ordinary cisterns.

Filters from £1 upwards.

The cisterns and filters may be seen in operation at the offices of the agent, 7 *Trinity Street, Trinity Square, Southwark, London, S.E.*

[2024]

WILKINS, WILLIAM PICKFORD, *Ipswich.*—2-cylinder high-pressure and condensing steam-engine of 20-horse power; set of 4-inch 3-throw pumps; 4-inch and 2-inch improved stop valve.

A 2-CYLINDER HIGH-PRESSURE CONDENSING STEAM ENGINE of 20 horse-power, which will drive well and economically six pairs of 4 ft. millstones.

It has been successfully applied to pumping, and is well adapted for most other motive purposes, especially where economy of space and fuel is an object.

Price, with Cornish boiler of ample dimensions, and all fittings complete. . . . £550 0

A SET OF 3-THROW PUMPS for either hot or cold liquor, very compactly arranged, the valves of ready access, on a simple plan, and entirely of gun-metal. The whole mounted in strong cast-iron frame.

Price £65 0

TWO SPECIMENS OF WILKINS' STRAIGHTWAY STOP VALVE, with the screw, valve, and seating of gun-metal, well and strongly made for high pressures. Price 1*l.* per in.

[2025]

WILLIAMSON, W., 133 *High Holborn.*—Washing, wringing, and mangling machine.

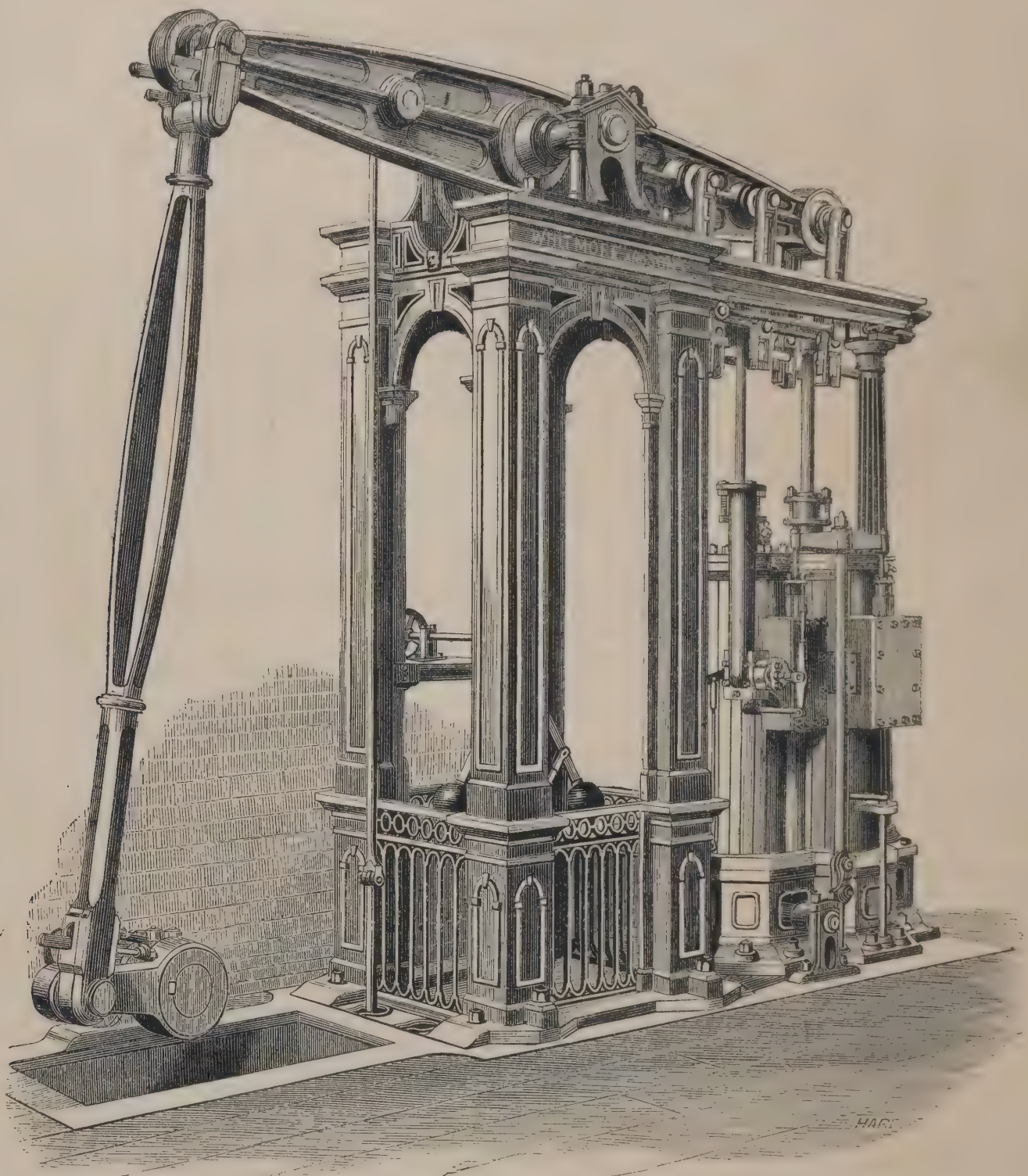
MACHINE FOR WASHING CLOTHES AND FABRICS, with rollers attached for wringing and mangling.

These washing machines have been adopted by the Admiralty and War Department for naval and military hospitals. They are made of sizes from 1 ft. 6 in. long, 12 in. wide, up to 9 ft. long, 4 ft. 6 in. wide.

Nursery washing machines. . . £2 5 to £3 5
Ditto, and for wringing and mangling. . . . 4 15 to 5 15

Domestic washing machines . .	£3 10 to £8 10
Ditto, and for wringing and mangling	8 10 to 15 10
Machines for institutions and laundries	12 10 to 15 10
Ditto, and for wringing and mangling	22 10 to 26 10
Power washing machines . . .	30 0 to 100 0
Ditto, with steam engine attached	50 0 to 150 0

WHITMORE & SONS, *Wickham Market, Suffolk*.—Improved steam engine; corn-mill machinery; engine details; framed drawings.



IMPROVED 35-HORSE POWER INDEPENDENT DOUBLE-CYLINDER CONDENSING ENGINE.

1. IMPROVED INDEPENDENT IRON HURST and fittings for 2 pairs of stones.

(See illustration on page 85.)

The novelty and improvement, consist in the arrangement provided for driving the stones by belt in lieu of gearing, and also for the continuous discharge of the meal around the entire peripheries of the stones, into galvanized metal or wood reservoirs within iron cylinders, on which also the bed stones are supported and easily made to adjust. This is found to produce coolness of, and less injury to the meal; entirely prevents the unpleasantness and waste through stive, renders exhausting apparatus almost unnecessary, and admirably facilitates the process of good milling. The fittings for neck and step bearings of stone, spindles, centre irons, feeding, adjusting, and disengaging gear, are all of the most approved construction; the main features being simplicity and durability.

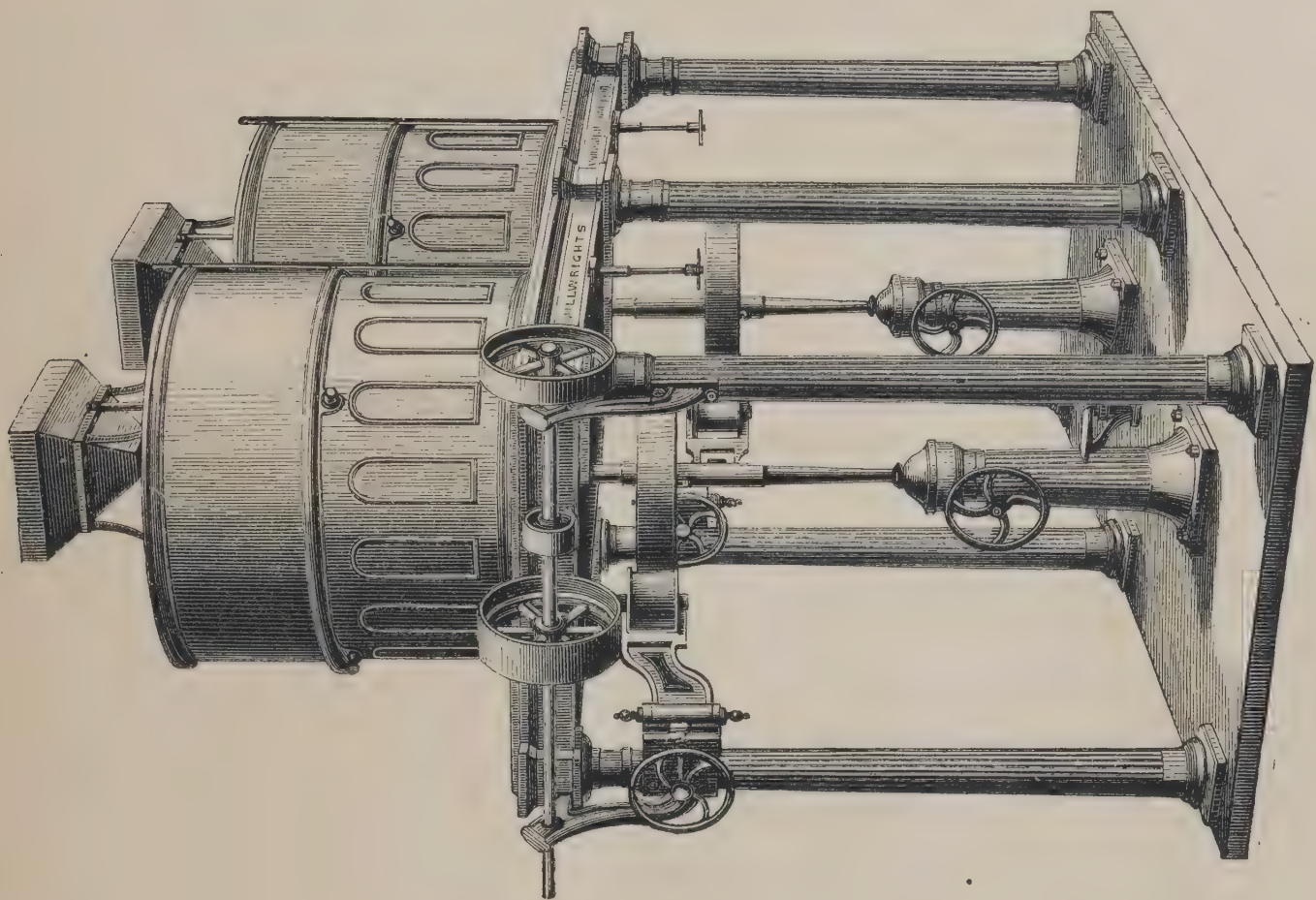
2. IMPROVED CONVEYING AND ELEVATING MACHINERY for meal and corn.

3. IMPROVED AND NEWLY-INVENTED DIRECT-ACTING HIGH-PRESSURE STEAM ENGINE of 10-horse power, with vertical crank shaft and horizontal fly wheel; the latter being situate within the bed plate of the engine.

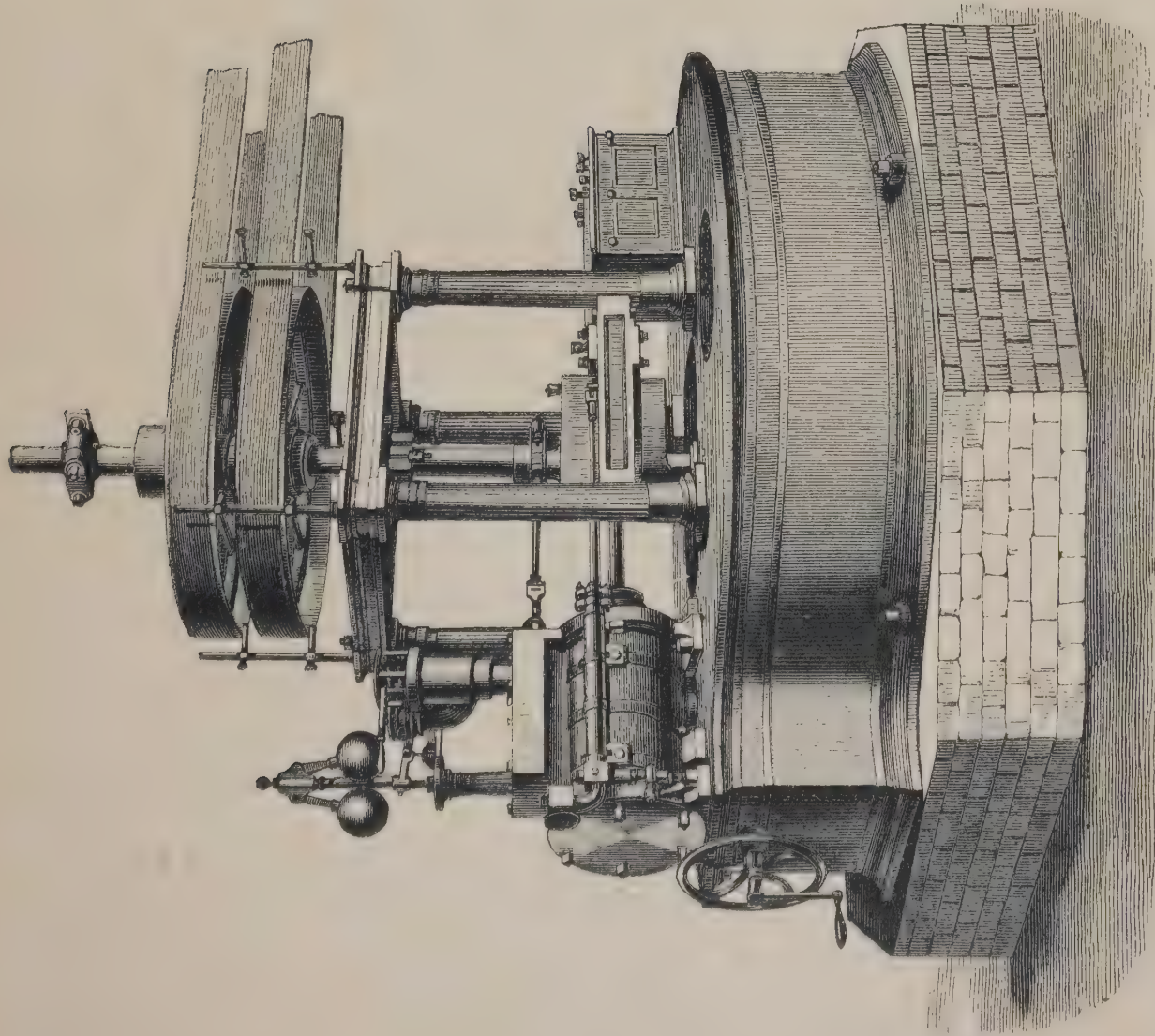
(See illustration on page 85.)

This engine is particularly compact and simple, and well adapted for driving the foregoing machinery in mills on a small scale. The crank shaft is of solid forged iron with steel end revolving in steel step, and the governor, starting apparatus, &c. are all on an improved principle. The construction of the engine is such, that the usual friction is considerably reduced; it is easily accessible in all its parts; and requires little or no fixing.

WHITMORE & SONS, *continued.*



IMPROVED INDEPENDENT IRON HURST FOR TWO PAIR OF STONES.



DIRECT ACTING HIGH-PRESSURE 10-HORSE POWER STEAM ENGINE.

WHITMORE & SONS, *continued.*

4. MODEL OF IMPROVED INDEPENDENT STEAM BOILER OR GENERATOR, with 2 internal flues, and so constructed as to allow for the unequal contraction and expansion usually experienced in the Cornish boiler, and also for the easy detachment of the same for the effectual removal of incrustation or deposit, or repairs when occasion requires it.

It is encased in a jacket of sheet plate (which may be lagged and felted), with smoke box, door fittings, and funnel, complete; rendering the fixing in brickwork unnecessary, and providing at the same time an unusual amount of heating surface all round the boiler; thus ensuring safety, purity of steam, and economy of fuel.

5. MODEL OF IMPROVED MACHINE for dressing flour through silks, with cylindrical shaft, trussed reel, vibrators, feeding apparatus and conveyors, complete.

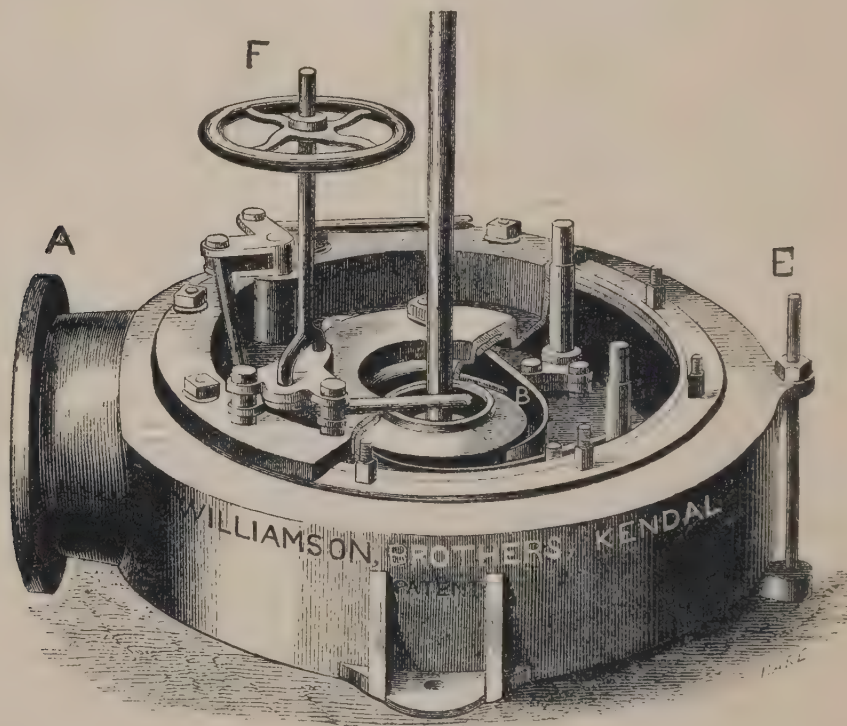
6. MODEL OF IMPROVED IRON BREAST WATER WHEEL with ventilated curvilinear buckets and supply valve, and apparatus complete.

7. MODEL OF TOWER WINDMILL with patent sails and self-winding tackle.

Whitmore & Sons have fitted up a considerable amount of the above improved corn-mill machinery in establishments on a large scale in this and foreign countries, the arrangements differing according to circumstances, particulars and testimonials of which will be given on application either at their Works, or at the Exhibition stand, where drawings may be seen of them; and of both single and double cylinder high and low pressure and condensing steam engines, boilers with patent furnaces, general mill, sawing, and agricultural machinery of their manufacture.

[2026]

WILLIAMSON BROTHERS, *Canal Iron Works, Kendal, Westmoreland.*—Patent vortex turbines, blowing fan, centrifugal pump, &c.



PATENT VORTEX TURBINE, an improved means of applying water-power.

The vortex turbine is equally adapted for high and low falls. Its peculiar advantages are:—

1. That the power is obtained with a slower velocity of the water, and consequently with less friction than in ordinary turbines.

2. Great steadiness and regularity of motion.*

3. A thoroughly efficient means of adjustment to

varying supplies of water. A large working model is exhibited in motion.

Williamson Brothers also exhibit in action—

A WHIRLPOOL BLOWING FAN,

A WHIRLPOOL CENTRIFUGAL PUMP; and

A PATENT VERTICAL-COLUMN STEAM ENGINE.

Descriptive circulars may be had on application to the makers.

[2027]

WILSON, JOHN C., & CO., 14A *Cannon Street, London, E.C.*—Portable steam sugar-cane mill. (*See page 87.*)

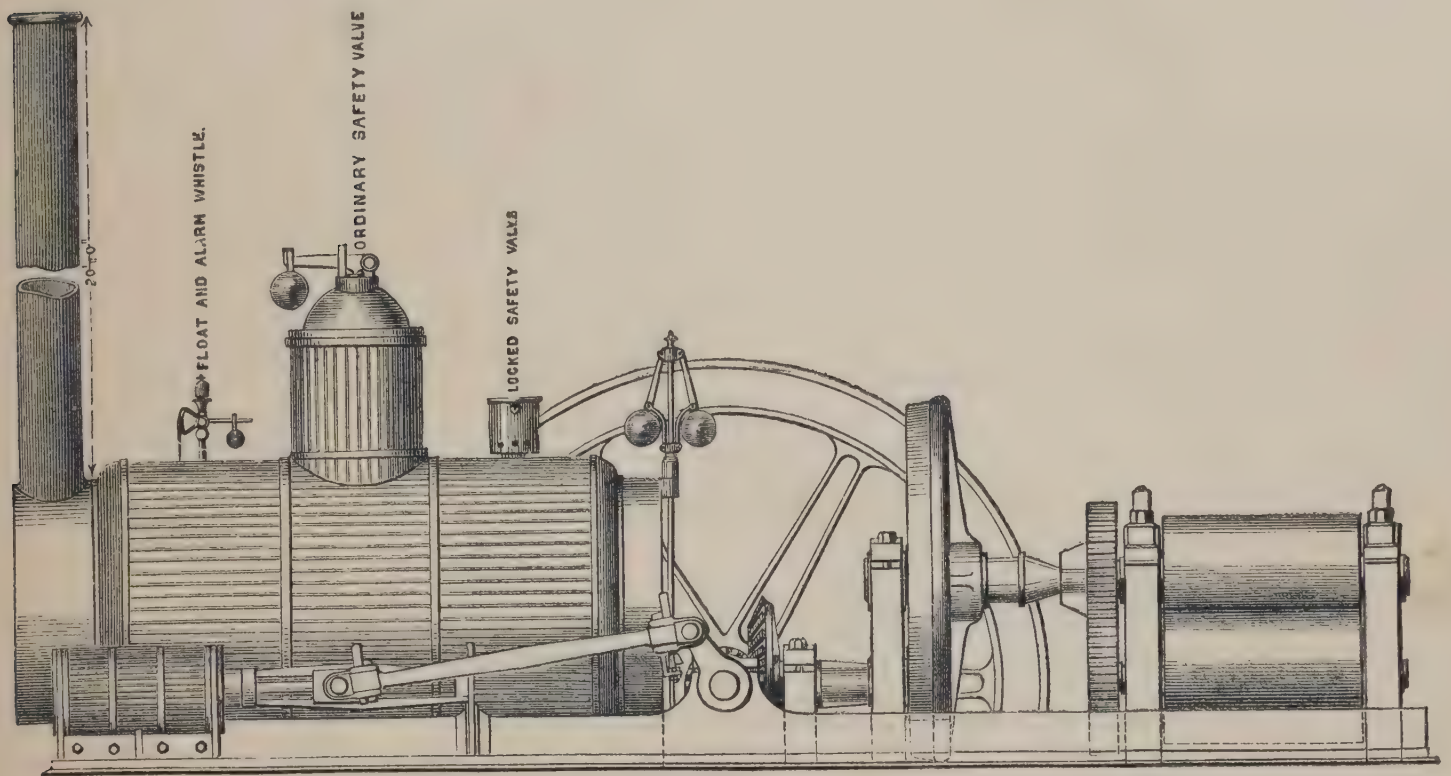
[2028]

WISE, FRANCIS, 22 *Buckingham Street, Adelphi, W.C.*—Feed water regulator, indicator, and alarm for steam boilers. (*See page 88.*)

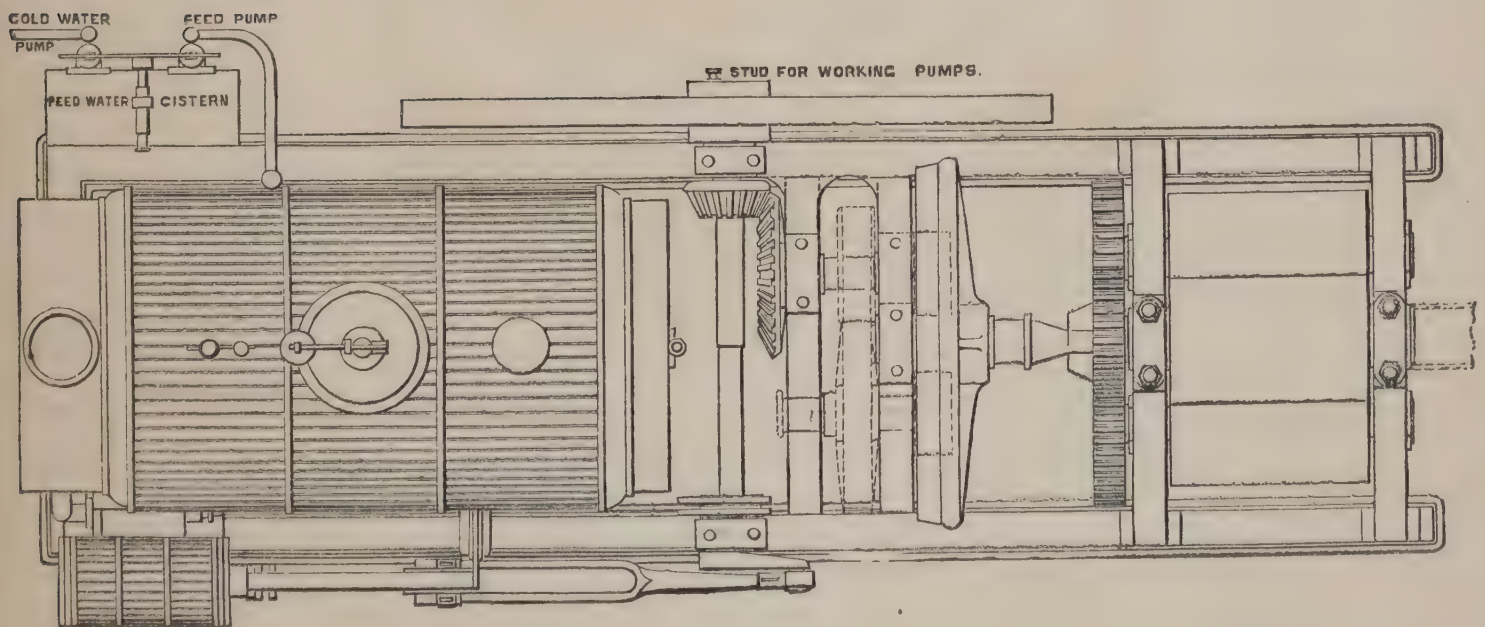
[2029]

WOOD, ROBERT, & SONS, *Leeds.*—20-horse double-cylinder engine, steam pump, shafting, pulleys, and wheels.

WILSON, JOHN C., & Co., 14A *Cannon Street, London, E.C.*—Portable steam sugar-cane mill.



ELEVATION OF WILSON'S PORTABLE STEAM SUGAR-CANE MILL.



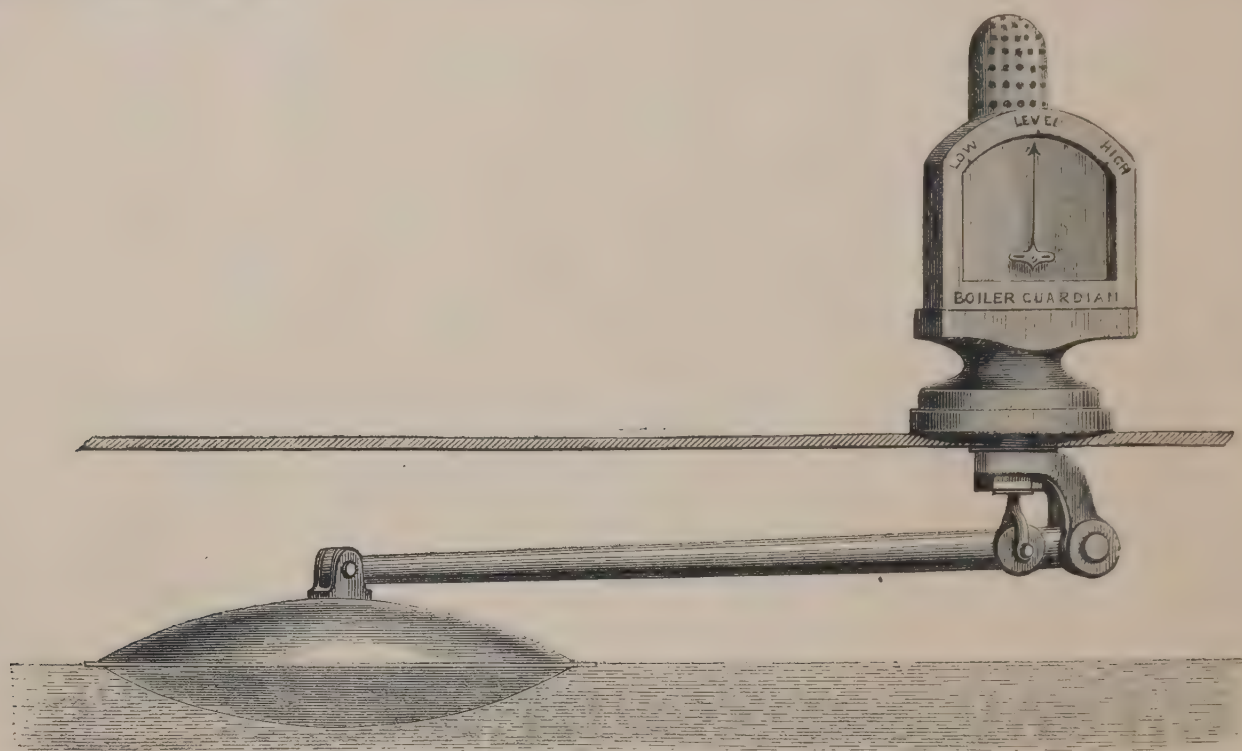
PLAN OF WILSON'S PORTABLE STEAM SUGAR-CANE MILL.

WILSON'S PATENT PORTABLE STEAM SUGAR-CANE MILL, with engine and portable boiler complete, on the same iron foundation-plate. Expensive brick foundations and setting of boiler dispensed with. No brick chimney required. An additional saving effected from the simplicity of erection and economy of fuel. Improved sugar machinery and apparatus of all kinds.

Cocoa nut and other oil machinery. Coffee and rice machinery. Flax steeping and scutching apparatus. Cotton cleaning and packing machinery, &c. &c. JOHN C. WILSON & Co., colonial engineers, 14A, Cannon Street, London.

International Exhibition. Machinery at work in Class VIII.

WISE, FRANCIS, 22 *Buckingham Street, Adelphi, W.C.*—Feed water regulator, indicator, and alarm for steam boilers.



FEATHERSTONHAUGH AND WISE'S FEED-WATER REGULATOR GAUGE.

FEATHERSTONHAUGH & WISE'S PATENT BOILER GUARDIAN, OR SELF-ACTING FEED-WATER REGULATOR, GAUGE, AND ALARM.

By a simple arrangement connected with a float within the boiler, and without the use of stuffing boxes, cocks,

or other complexities, this little apparatus regulates the action of the feed pump, indicates the water level, and should the latter from any cause fall below a certain point, it sounds an alarm, which calls timely attention to the fact. It is thus self-testing of its own efficiency and that of the pump.

[2030]

WOODCOCK & LEE, 33 *Old Street, London, C.E.*—Machine for measuring, rolling, and indicating lengths of all kinds of cloth.

WOODCOCK & LEE'S MACHINE for measuring and accurately indicating the lengths of every description of piece goods, ensures the greatest accuracy in all measurements, and may be used at any rate of speed

that can be acquired with rollers and crank. It saves much time, and renders quite impossible the blunders which so frequently occur in measuring cloths by other methods. Price £10 0

[2031]

WORSDELL, THOMAS, *Berkeley Street, Birmingham.*—Steam crane, hydraulic and screw lifting jacks, hydraulic wire testing machines, &c. (See page 89.)

[2032]

WRIGHT, E. T., *Goscote Iron Works, near Walsall.*—Model of Wright's patent diagonal-seam steam boiler. (See page 91.)

[2033]

YARROW, A. F., *Barnsbury.*—Locomotive steam carriage.

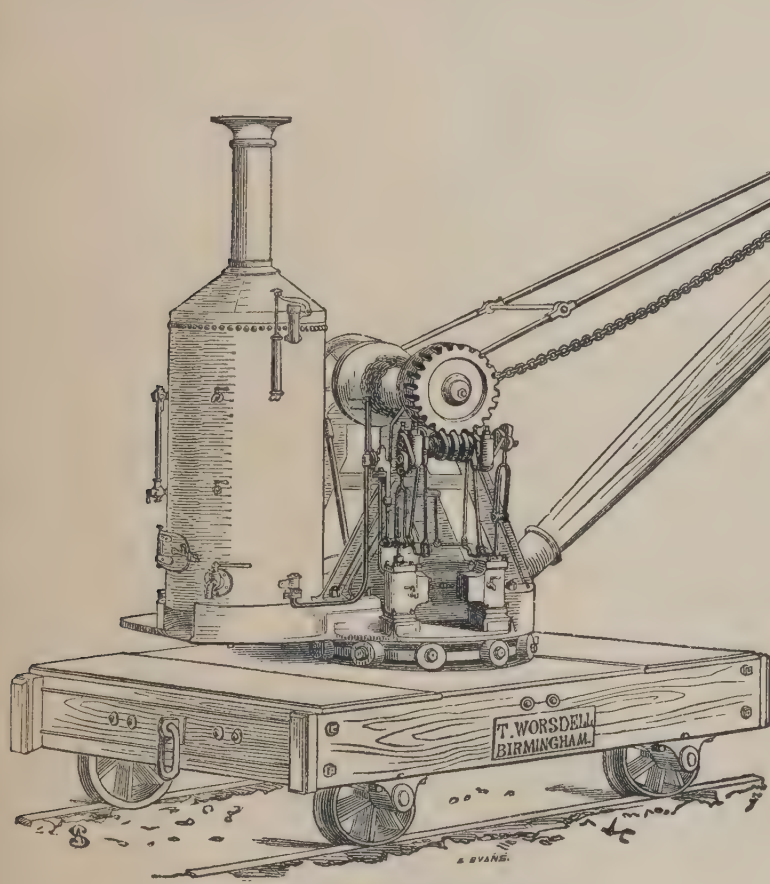
[2034]

YORK & Co., 2 *Royal Exchange Buildings, London.*—High-pressure steam boiler.

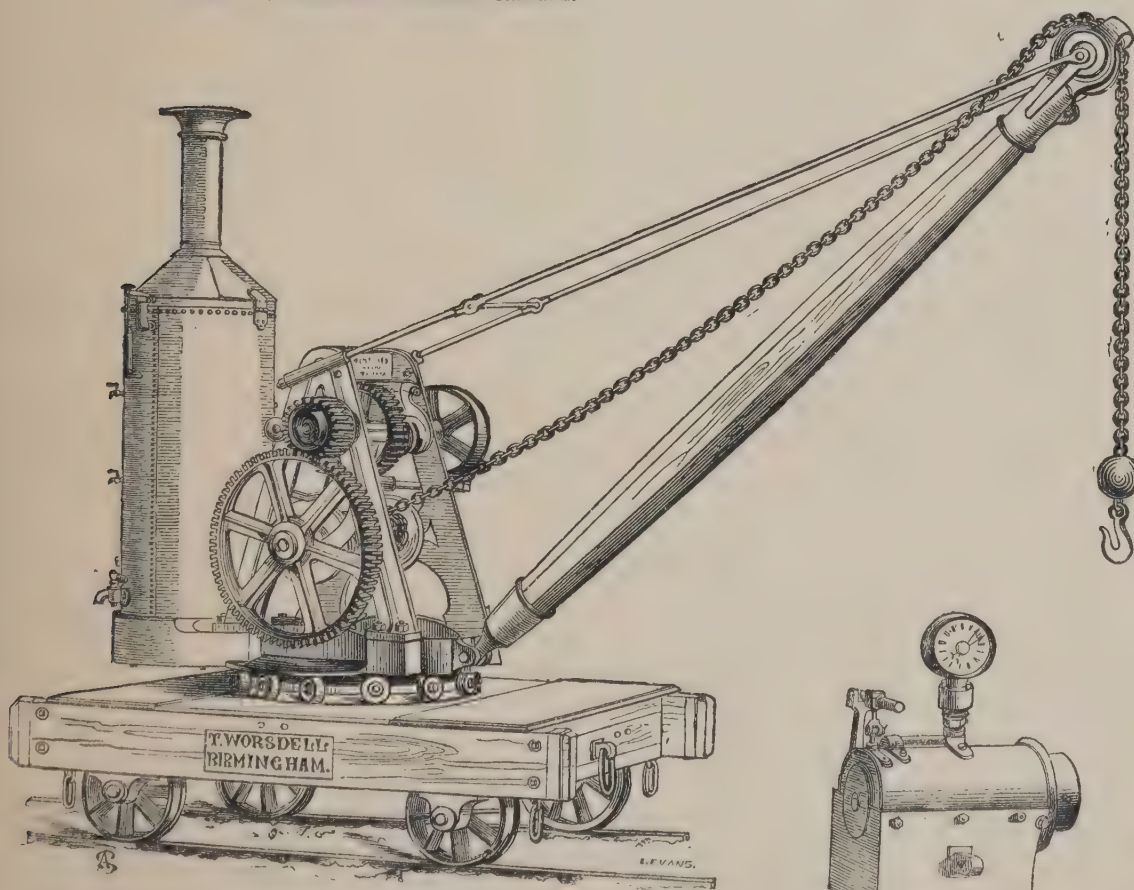
[2035]

ZANNI, GEMMINIANO, 51 *Lamb's Conduit Street.*—Self-basting roasting apparatus.

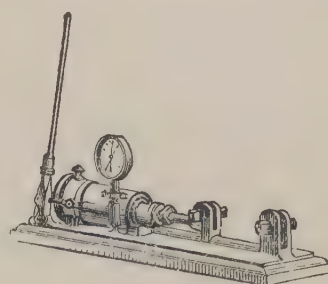
WORSDELL, THOMAS, *Berkeley Street, Birmingham.*—Steam crane, hydraulic and screw-lifting jacks, hydraulic wire testing machines, &c.



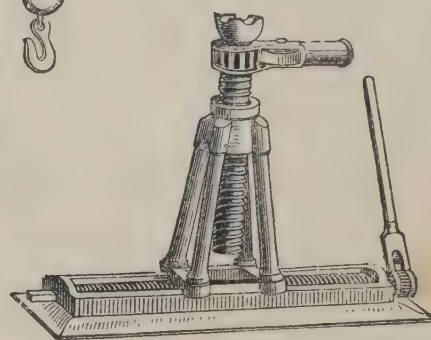
LIGHT PORTABLE STEAM CRANE.



PORTABLE STEAM CRANE.



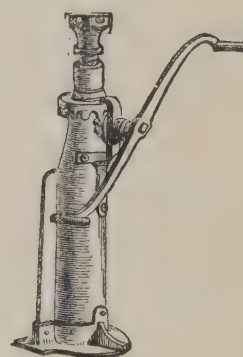
HYDRAULIC WIRE TESTER.



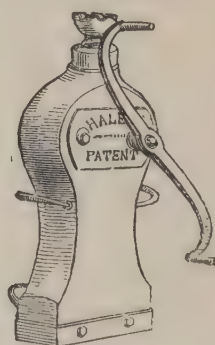
TRAVERSING JACK.



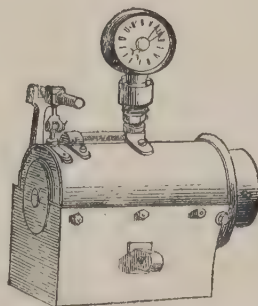
HYDRAULIC JACK.



WINDLASS JACK.



HALEY JACK.



HYDRAULIC GIRDER TESTER.



TRAIN SIGNAL BELL.

The following is a list of the principal manufactures of this exhibitor:—

Contractors' locomotives, portable and other steam engines; steam wharf, ship, and travelling cranes; hand wharf, travelling, derrick, and other cranes; steam and hand winches; travelling crabs for gantry frames; pulley blocks, &c.

Engineers' tools, including self-acting screw-cutting and other lathes; planing, slotting, drilling, screwing, punching and shearing machines; ratchet braces, &c.; nail-cutting, rivet, wood-screw, and general machinery.

Wrought-iron smiths' hearths, anvils, vices, &c.

CLASS VIII.

Lifting jacks; including patent traversing, Haley's windlass, tripod, bottle, and other kinds.

Improved patent wrought-iron hydraulic lifting jack, to raise from 4 to 200 tons.

Hydraulic machines to test bar iron, steel, chain cables, girders, and (small portable) for wire.

Railway bell signal apparatus, for communicating between guard and engine man, as supplied to various railway companies.

Rail-setting presses, jim-crows, and other contractors' tools.

Railway buffers, screw couplings and cramps, bolts and nuts, &c.

GOODALL, HENRY, *Derby*.—Patent grinding and sifting machine.

The substances or materials to be operated upon are placed in the mortar, in which the pestle is made to work by mechanical means in such a manner as to give the same rubbing motion as is imparted thereto by hand, when substances are ground or pulverised in a mortar by manual labour.

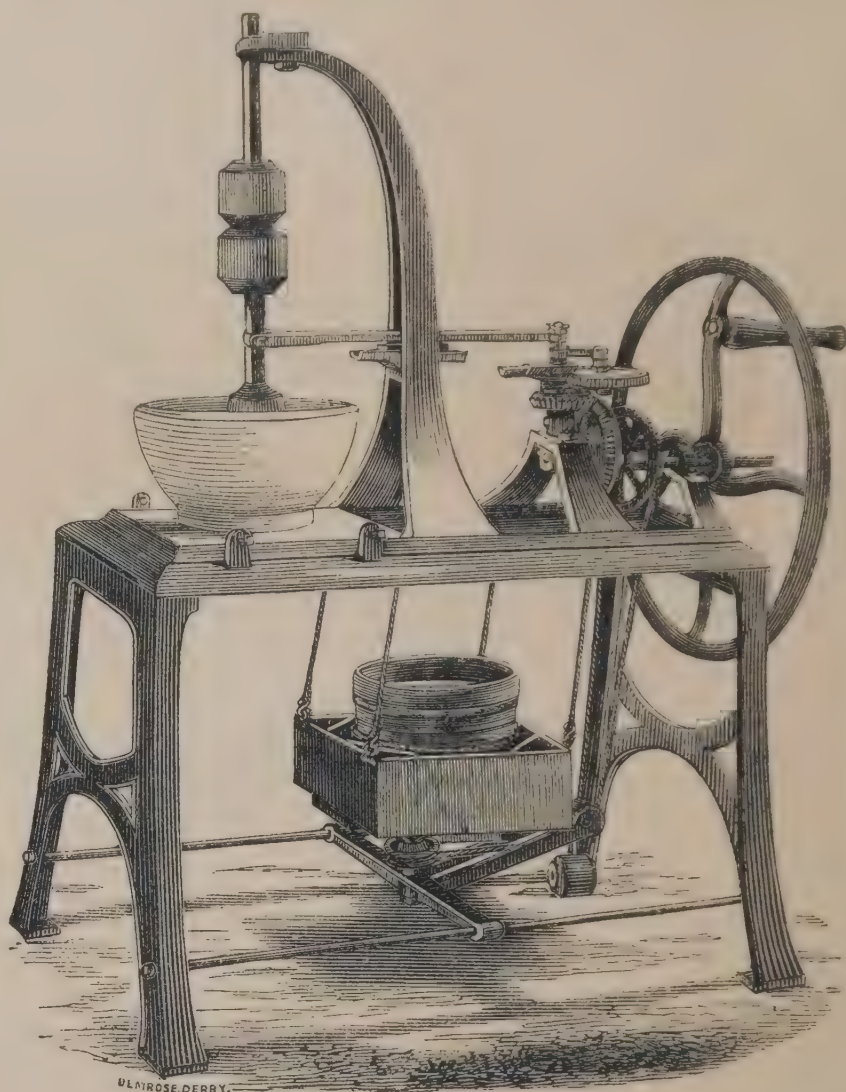
The amount of labour saved is considerable, as the hardest and most difficult substances may be ground by this machine, worked by hand, as effectually as by the most powerful machinery, enabling druggists and others to grind articles perfectly on a small scale which could only be done hitherto by mills requiring great power to drive them. On a large scale, driven by steam, it is found to do more work with less power than any mill previously erected.

Its simplicity of construction prevents the possibility of disarrangement.

Amongst the articles which are readily ground by it may be mentioned ginger, salts of all kinds, sugar, cocoa, spices, drugs, &c.; and for mixing or kneading lozenges, pill masses, glazier's putty, bread, biscuits, &c.

A sifting apparatus is added to the above machine, so that the operation of powdering and sifting may be carried on at the same time.

Reference can be given to parties who have them in use, and to numerous engineers and scientific gentlemen, who have seen them at work, and pronounced them the most complete machines ever invented.



Price according to size:

	With changing rotary motion.	With simple rotary motion.	With changing rotary motion.	With simple rotary motion.
Machine to fix on counter, including a 10-in. mortar	£6. 0 0	£5 0 0	Ditto, with sifter	14 0 0 12 10 0
Ditto, on strong iron frame, including a 13-in. Wedg- wood mortar	12 10 6	11 0 0	Large machine for steam power	55 0 0 45 0 0
			Nett cash at Derby.	

GOODALL'S DOMESTIC KNEADING MACHINE, for the use of private families, hotels, club-houses, confectioners, &c.

This machine will be found of great service to all parties desirous of having good bread.

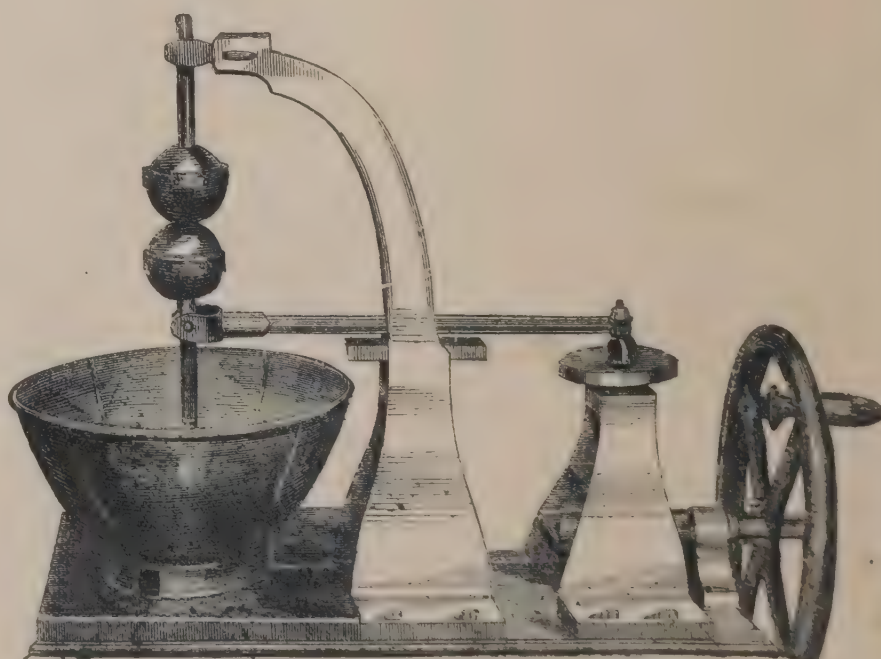
It performs the operation of mixing or kneading dough in a far better and more expeditious manner, and is much cleaner than the ordinary method of kneading with the ahnds.

It is also applicable for making potted meats, grinding suet for puddings, instead of chopping; or raisins, instead of picking out the stones; for beating eggs, mixing biscuits, cakes, puddings, powdering sugar, spices, &c., in short, for any purpose in the cooking department where kneading, grinding, or mixing is required.

They are made in sizes to mix from eight pounds of flour upwards.

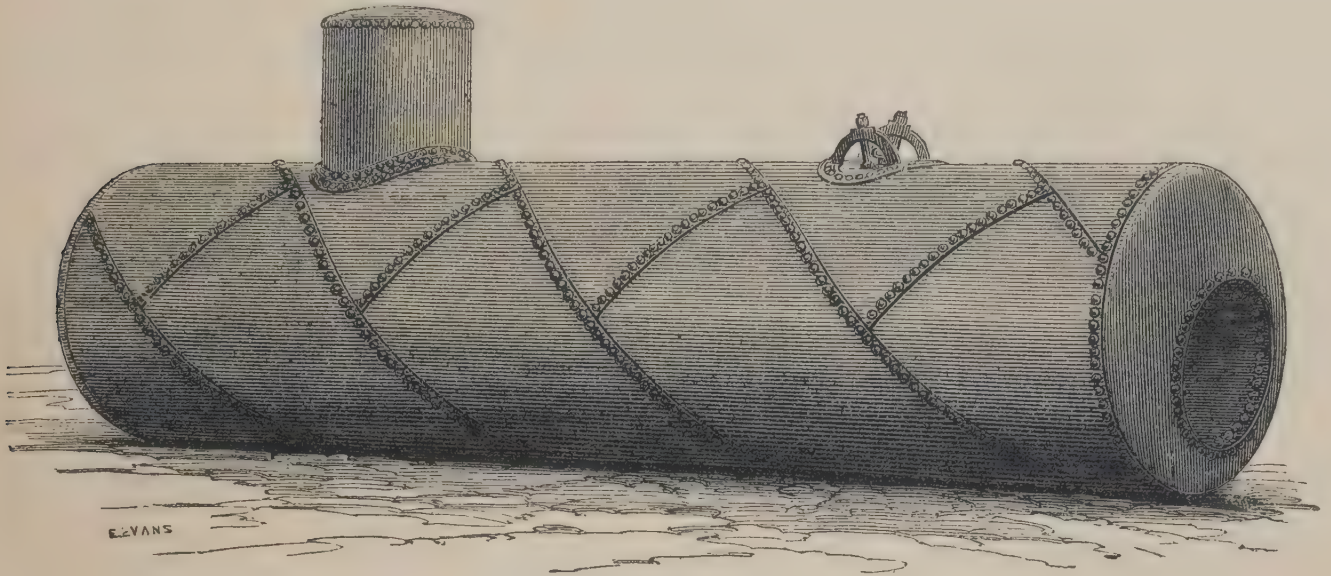
Price according to size, a small machine, with tin bowl for making bread, £3 3s.; with stone mortar in addition, for making potted meats, &c. £4 4s.

May be procured from the inventor and manufacturer, H. Goodall, St. Peter's Street, Derby.



GOODALL'S DOMESTIC KNEADING MACHINE.

WRIGHT, E. T., *Goscote Iron Works, near Walsall.*—Model of Wright's patent diagonal-seam steam boiler.



DIAGONAL-SEAM STEAM BOILER.

MODEL OF A CYLINDRICAL STEAM BOILER, constructed with Wright's patent diagonal seams, by means of which, longitudinal joints are altogether avoided, and 40 per cent. additional strength is required.

It is but recently that attention has been directed to the inequality in the resisting forces in the transverse and longitudinal sections of cylindrical steam boilers. Mr. W. Fairbairn, in his book, "Useful Information for Engineers," says:—"If we refer to the comparative merits of the plates composing cylindrical vessels subjected to internal pressure, they will be found in this anomalous condition, that the strength in their longitudinal direction is twice that of the plates in the curvilinear

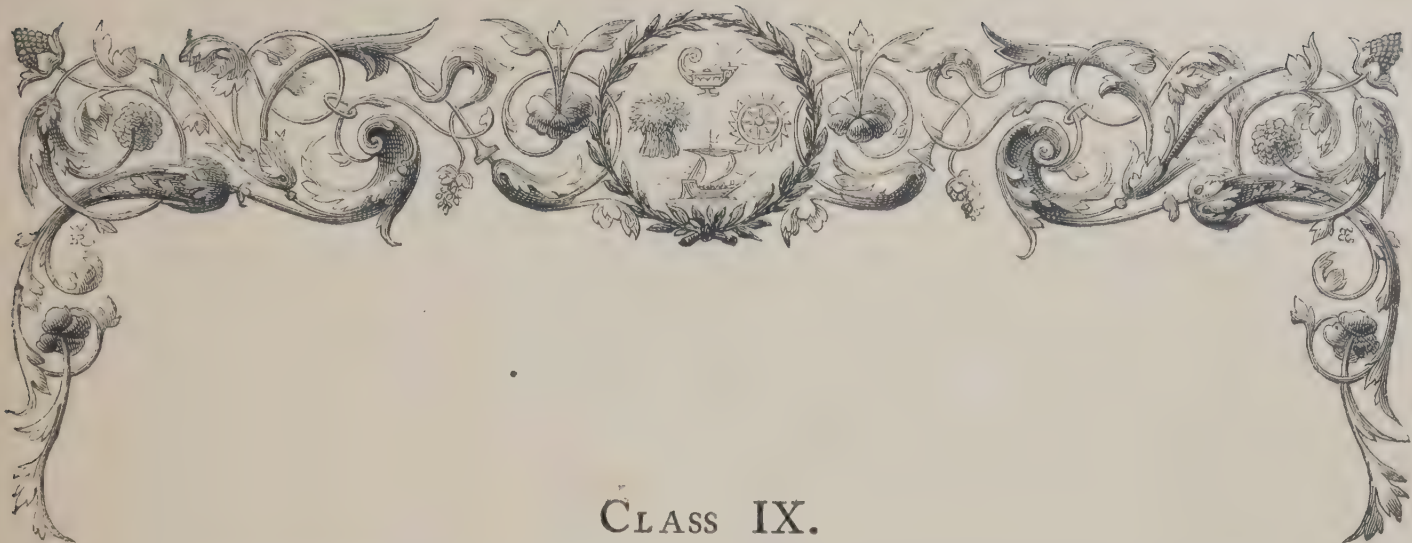
direction. This appears by a comparison of the two forces, wherein we have shown that the ends of the 3 ft. boiler, at 40 lbs. internal pressure, sustain 360 lbs. of longitudinal strain upon each inch of a plate $\frac{1}{4}$ in. thick; whereas plates of the same thickness have to bear, in the curvilinear direction, a strain of 720 lbs." And, it being a well ascertained fact, notwithstanding the vulgar notion to the contrary, that the ordinary or single riveted joint possesses but half the strength of the solid plate, it results that the longitudinal seams are the weakest parts of ordinary cylindrical boilers, however good the workmanship may be; and that sound principles of construction demand the abandonment of the common method of making them.



LONDON:

R. CLAY, SON, AND TAYLOR, PRINTERS,
BREAD STREET HILL.



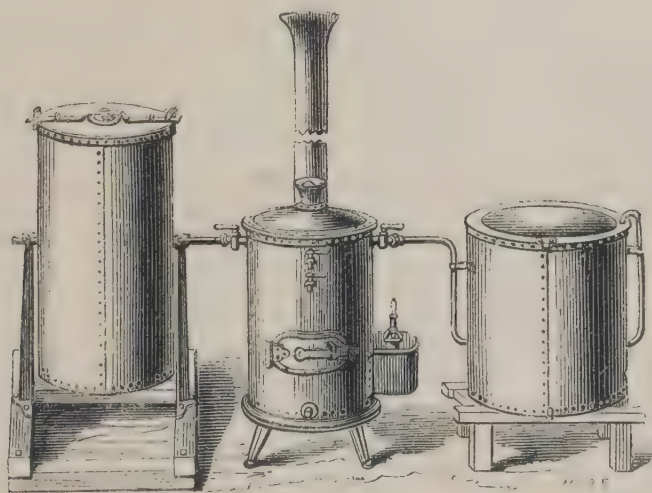


CLASS IX.

AGRICULTURAL AND HORTICULTURAL MACHINES AND IMPLEMENTS.

[2071]

AMIES & BARFORD, *Peterborough*.—Portable steaming apparatus, registered sack elevator, water ballast land roller, clod crusher.



PORTABLE AND FIXED STEAMING APPARATUS.

STANLEY'S REGISTERED PORTABLE AND FIXED STEAMING APPARATUS.

Amies & Barford are the sole manufacturers of this celebrated and economical apparatus, of which 500 sets are now in successful use by eminent agriculturists in the United Kingdom for steaming food for cattle, and for domestic purposes. It is used in one hundred of the principal gaols, asylums, and other public buildings. It has obtained *every* first prize for which it has competed

at the Royal and other agricultural shows during the last ten years, and is universally acknowledged to be the best, cheapest, and most economical apparatus extant.

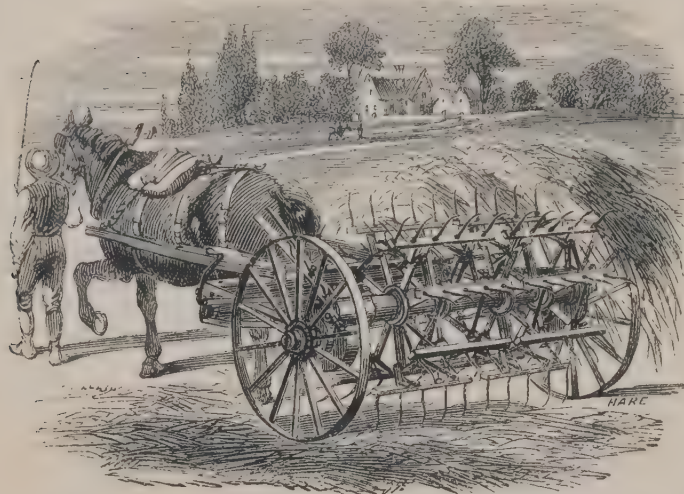
The exhibitors are manufacturers also of prize clod crushers, land rollers, registered sack elevators, patent field stiles, Government outfall drainage pipes, &c. &c.

Descriptive illustrated catalogues will be forwarded on application.

[2072]

ASHBY, T. W., & Co., *Stamford*.—Hay-maker; rotating harrows; meal grinding mill; oil-cake breakers; chaff and cane-top cutter for power; chaff-cutters; 2½-horse power portable steam-engine; horse rake; wheel hand-rake; horse power works; saw-table, &c. (*See page 2.*)

ASHBY, T. W., & Co., *Stamford*.—Hay-maker ; rotating harrows ; meal grinding mill ; oil-cake breakers ; chaff and cane-top cutter for power ; chaff-cutters ; 2½-horse power portable steam engine ; horse rake ; wheel hand-rake ; horse power works ; saw-table, &c.



SMITH AND ASHBY'S PATENT HAYMAKING MACHINE.

The following implements are exhibited by T. W. Ashby & Co.:—

SMITH & ASHBY'S PATENT HAYMAKING MACHINE.

This haymaker has received 49 first-class prizes from the Royal and Provincial Agricultural Societies of England, Scotland, Ireland, France, Austria, and Holland. It is one of the strongest and most efficient hay-makers in the world.

Price £15 15
Price, (T. W. A. & Co.'s new patent), simplified, and of extra power 16 16

SMITH & ASHBY'S PATENT STEEL-TOOTH HORSE RAKE, very greatly improved, has taken 38 prizes.
Price, with 26 teeth £8 5

SMITH & ASHBY'S PATENT WHEEL HAND-RAKE.

Price £2 0

IMPROVED 2½-HORSE POWER PORTABLE STEAM ENGINE specially adapted for farm work and for the colonies

Price, with improvements £83

If with patent indicator, £3 extra.

1-HORSE GEAR WORKS. Price £10 10

NO. 3 PATENT SAFETY CHAFF CUTTER for steam-power

Price £14 0

NO. 4 PATENT SAFETY CHAFF CUTTER for horse-power

Price £9 10 0

NO. 6 CHAFF CUTTER for hand-power. Price 6 0 0

NO. 7a CHAFF CUTTER for small stables. Price 3 10 0

NO. 8 CHAFF CUTTER Do. Price 2 12 0

IMPROVED OIL CAKE MILL No. 1. Price 3 5 0

IMPROVED OIL CAKE MILL No. 2. Price 3 10 0

PORTABLE STONE GRINDING MILL, obtained first prize of the Royal Agricultural Society, 1860. Price £45 0 0

IMPROVED CIRCULAR SAW TABLE. Price . £15 10 0

T. W. ASHBY & CO.'S PATENT ROTATING HARROW

Single £3 0 0

Per pair, with draught bar complete. 6 0 0

PATENT STEEL SHIELD to prevent the wear of cranks ; patent staple beater drum and concave, and spring hanger for thrashing machines.

Descriptive catalogues will be sent free on application.

[2073]

AVELING, J. *Rochester, Kent*.—Agricultural locomotive engine (*See page 3.*)

[2074]

BAIN, MCNICOL, & YOUNG, 29, *Cross Causeway, Edinburgh*.—Wire netting, fencing, and iron gates.

[2075]

BALL, WILLIAM, *Rothwell, Northampton*.—Agricultural cart, ploughs, &c.

[2076]

BAMLETT, ADAM C., *Middleton Tyas, Yorks*.—The Royal Agricultural Society's first prize manual delivery reaper, 1861.

[2077]

BARNARD, BISHOP, & BARNARDS, *Norwich*.—Patent root pulpers, Norfolk pig-troughs, patent mangles, iron garden and park chairs, galvanized iron wire netting.

PATENT ROOT PULPER.

PATENT ROOT PULPER for power.

Two varieties of IMPROVED NORFOLK PIG TROUGHS.

Universal SELF-ROLLING MANGLE.

Twelve varieties of IRON GARDEN AND PARK CHAIRS with spiral wire seats.

The Patent Gravitating BRITISH ROCKING LOUNGE.

Fifteen varieties of machine-made WIRE NETTING, galvanized in the piece.

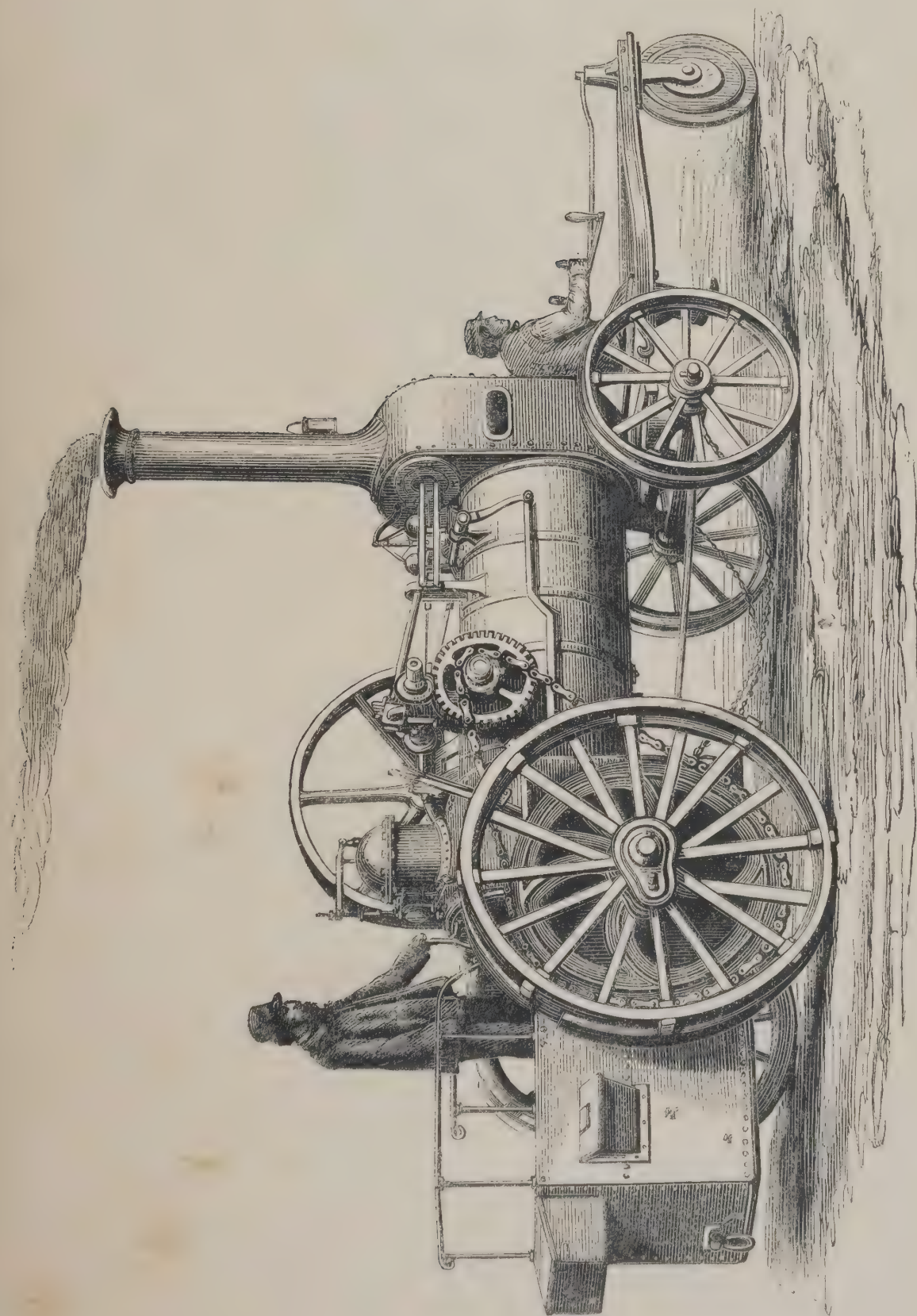
[2078]

BARRETT, EXALL, & ANDREWES, *Reading, Berkshire*.—Horse and steam thrashing machines, engines, mills, and agricultural machinery. (*See pages 4 to 6.*)

AVELING J., *Rochester, Kent.*—Agricultural locomotive engine.

This engine has an improved patent extra-large boiler, fitted with 37 $2\frac{3}{4}$ -in. tubes, external plates of the best Butterley iron, fire box and tube plates of Bowling iron, with extra stays for high-pressure; the fire grate measures 31 in. by 34 in. and is suitable for wood or

coal fuel. The cylinder, 10 in. diameter, is surrounded by a jacket, and placed on the forward part of the boiler, by which arrangement priming in ascending steep inclines is prevented. The crank shaft is of Lowmoor iron. The engine is fitted with improved governor, reversing link



AVELING'S PATENT AGRICULTURAL LOCOMOTIVE.

AVELING'S PATENT AGRICULTURAL LOCOMOTIVE, to which the first prize gold medal was awarded at the late show in Mecklenburg-Schwerin.

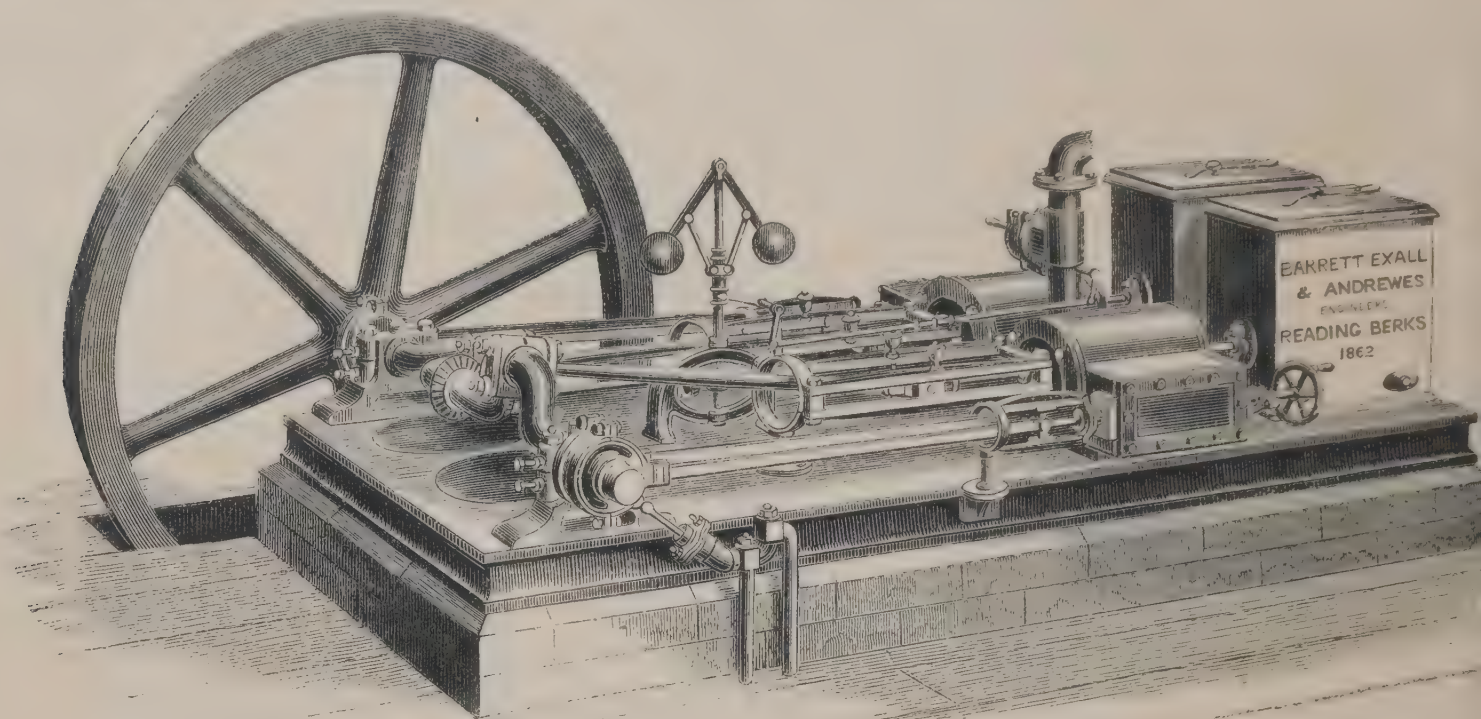
Forty of these engines are now in constant use. Prices, particulars, and testimonials, and also estimates for the conversion of portable engines into locomotives, can be obtained on application to the manufacturers.

motion, patent tender and water tank, under foot-plate, driving chain and gear, steam-pressure gauge, extra lock-up safety valve, steam jet blower, firing tools and wrenches, driving wheels 5 ft. 6 in. diameter, 12 in. wide, patent steerage and screw break for descending inclines.

The engine is remarkable for its simplicity, and the great strength of its working parts. It is capable of drawing 10 tons up an incline of 1 in 6, and can be readily managed by any ordinary engine driver.

Price. £420 0

BARRETT, EXALL, & ANDREWES, *Katesgrove Iron Works, Reading, Berkshire.*—Horse and steam thrashing machines, engines, mills, and agricultural machinery.

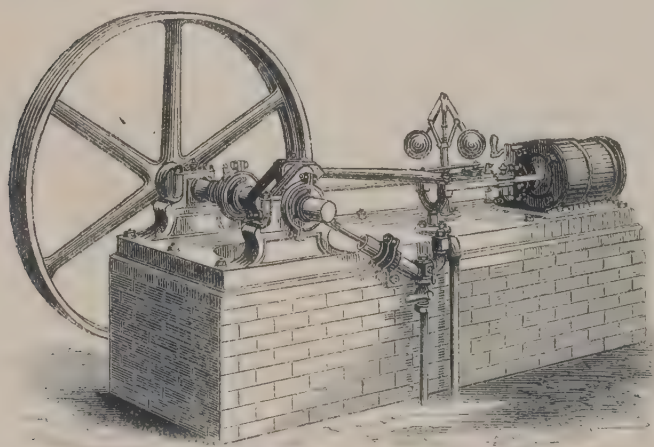


BARRETT, EXALL, AND ANDREWES' THIRTY-HORSE ENGINE.

A 30-HORSE POWER DOUBLE CYLINDER HIGH-PRESSURE EXPANSION ENGINE of the highest class, fitted with condensers (extra), giving full 30 per cent. of advantage in economy.

It is fitted with governor, pump, throttle and expansion valves, variable to any extent; a Lowmoor wrought crank shaft, mounted on a solid metal bed plate, planed and finished. It can be used without the condensers if there is not a good supply of water, but with that the consumption of fuel will be from 2 to 3 lbs. of coal per indicated horse power per hour.

It will be found at work in the Western Annex.

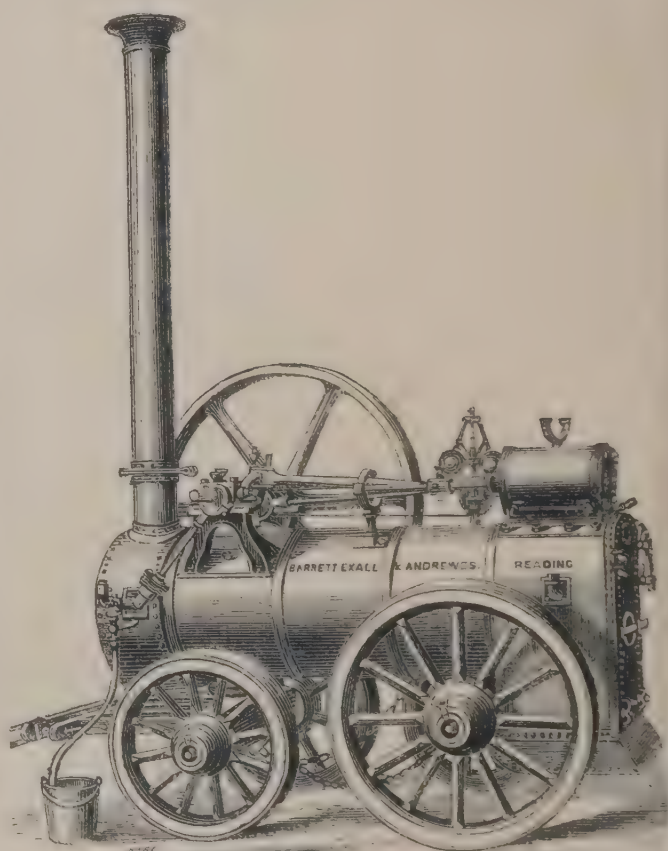


BARRETT, EXALL, AND ANDREWES' TEN-HORSE ENGINE.

A 10-HORSE POWER HORIZONTAL HIGH-PRESSURE FIXTURE ENGINE, fitted with governor, throttle valve, pump, and wrought-iron crank shaft; it is fixed upon a solid planed-metal bed-plate, which renders it self-contained.

The character of its construction enables it to be removed without disturbing the foundations, it works most economically, and has worked 3 hours with 140 lbs. of coal, which will be its average consumption. It will work expansively from one-third to full steam.

A 3-HORSE POWER HORIZONTAL HIGH-PRESSURE FIXTURE ENGINE, fitted same as the 10-horse power.



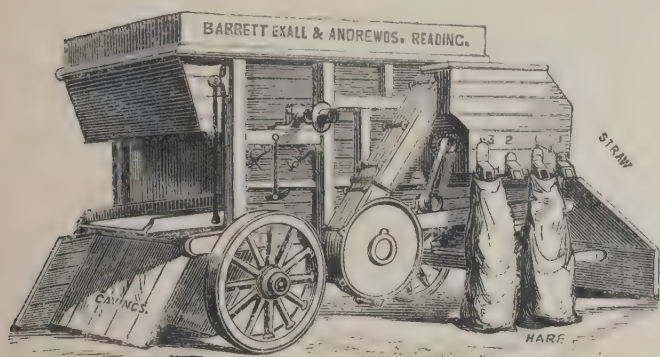
BARRETT, EXALL, AND ANDREWES' PORTABLE STEAM ENGINE.

AN 8-HORSE POWER HIGH-PRESSURE PORTABLE STEAM ENGINE.

The boiler has 20 square ft. of heating surface for a nominal horse-power. The fire box is of Lowmoor iron and has an ample water space very accessible for cleaning. It is cased with wood and sheet-iron, and is supplied with governors, water gauge, steam-pressure gauge, steam whistle, gauge taps, pump, and partial water heater, the crank shaft is bent and of wrought-iron and the engine has every modern improvement.

A 3-HORSE POWER HIGH-PRESSURE PORTABLE STEAM ENGINE.

BARRETT, EXALL, & ANDREWES, *continued.*

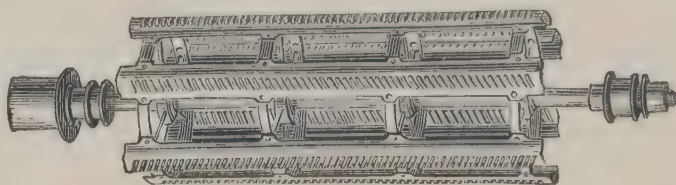


BARRETT, EXALL, AND ANDREWES' COMBINED THRASHING MACHINE.

AN 8-HORSE POWER PORTABLE COMBINED THRASHING AND FINISHING MACHINE.

It has the patent perforated beater drum 54 in. wide which is made wholly of wrought-iron, as is also the breasting. The straw shakers are of wood, and the screens reciprocate with them, which prevents vibration. The bearings are the patent spherical ones, which give absolute truth in setting the machine, never heat, and run easy. It has the new patent corn elevator, which elevates any description of grain without the ordinary cups, dresses the corn whilst passing to the separating screen, by which means a second blower and the usual barley aveller are rendered unnecessary, and the machine is greatly simplified, and bearings, pulleys, and straps are dispensed with, and the wear and tear greatly economised. It finishes the corn for market.

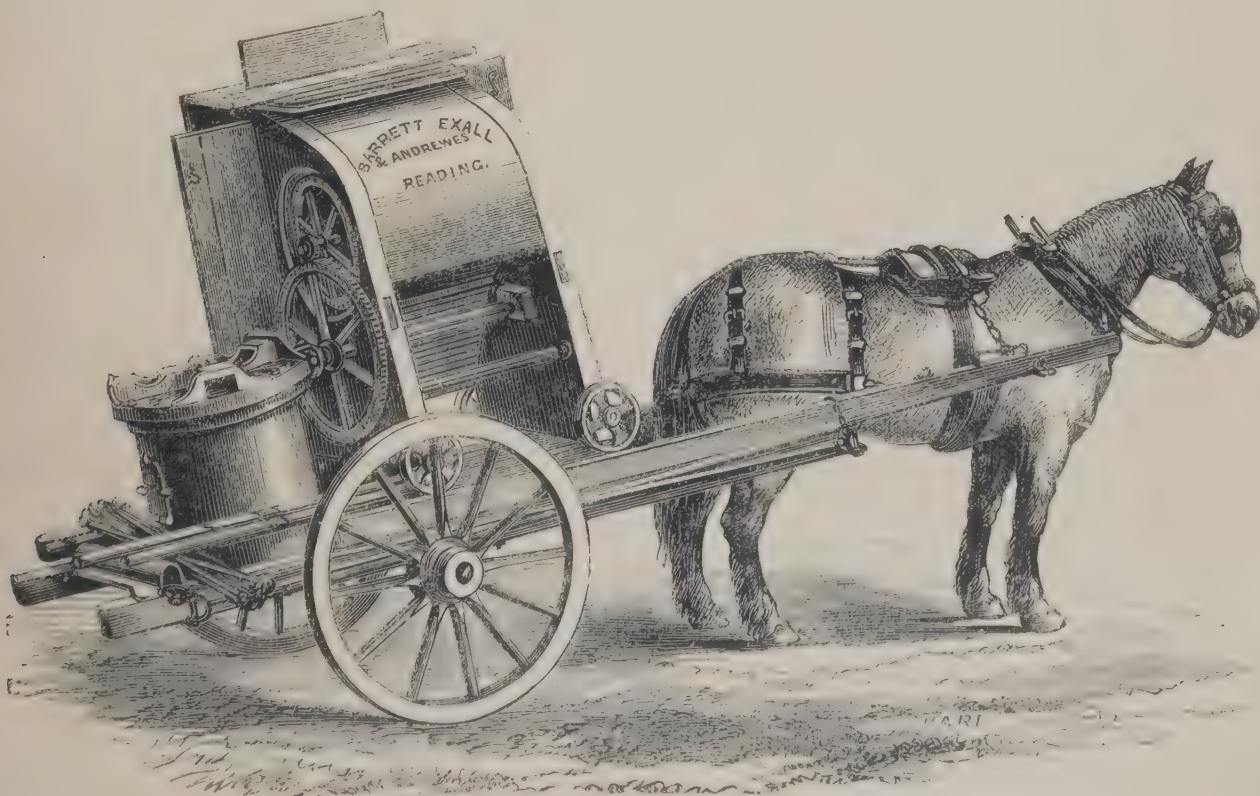
AN 8-HORSE POWER PORTABLE COMBINED SINGLE-BLAST THRASHING MACHINE, with patent perforated drum 48 in. wide. It is fitted with the patent spherical bearings, and the new patent corn elevator.



BARRETT, EXALL, AND ANDREWES' PATENT DRUM.

PATENT PERFORATED BEATER DRUM wholly of wrought-iron, perforated at an angle of 45° to the square, and bent in a mould to the requisite form for rubbing out the grain. It will thrash all varieties of grain without injury, and is adapted to any existing thrashing machine.

PATENT HORSE-POWER PORTABLE THRASHING MACHINE, constructed for 3 light horses. The drum and breasting are entirely of wrought-iron; the latter formed of separate bars with serrated faces, the ends of which pass through slots in the sides of the machine and are set nearer to, or carried further from, the drum, by means of 2 revolving plates, having a continuous grooved worm cut on their faces, which increase the space between each as it is set to or from the drum,



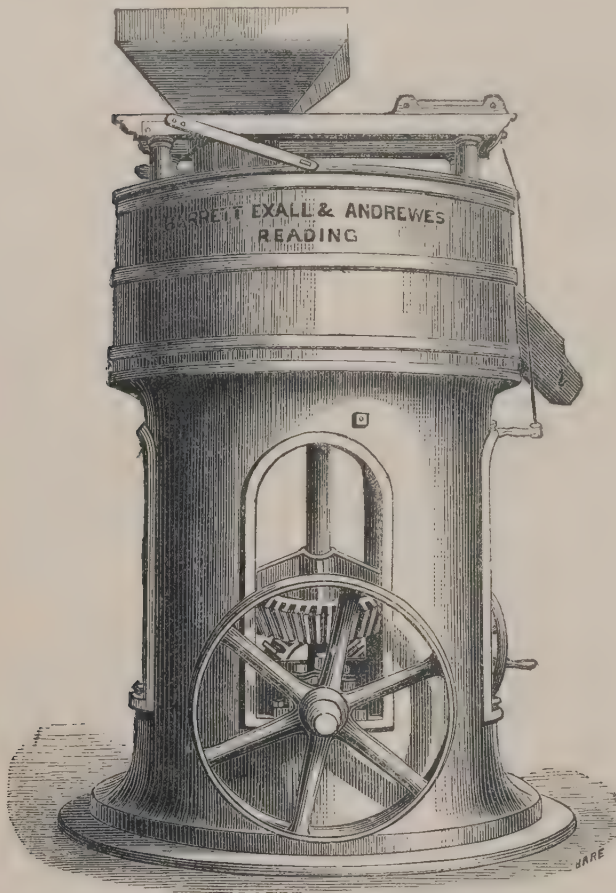
BARRETT, EXALL, AND ANDREWES' PATENT THRASHING MACHINE.

and thus allow the larger corn room to escape. The gear work is wholly inclosed in an iron cylinder, and by the arrangement of the wheels the strain is equalized and the friction reduced, whilst all accidents are effectually prevented.

The gear work gives a speed of about 100 revolutions per minute, and the machine will thrash all kinds of grain perfectly. It is most valuable for export, and is in general use in all the corn-growing countries of Europe.

BARRETT, EXALL, & ANDREWES, *continued.*

PATENT HAND THRASHING MACHINE, fitted with the patent wrought-iron drum and breasting, and contained in iron frame. It will thrash all kinds of grain and seed without injury.

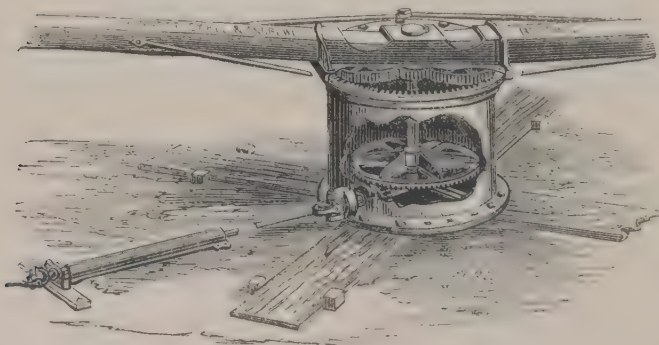


BARRETT, EXALL, AND ANDREWES' CORN MILL.

CORN-GRINDING MILL fitted with 48-in. French burr stones, the upper one revolving. An adjusting power is given so that it may be raised or lowered at pleasure. The whole mill is self-contained in a cylindrical iron frame, and is of the first class in all respects.

CIRCULAR SAW BENCH. The frame is wholly of iron, the bed plate is planed, fitted with metal fence, metal roller for the timber, boring apparatus, and fast and loose pulleys.

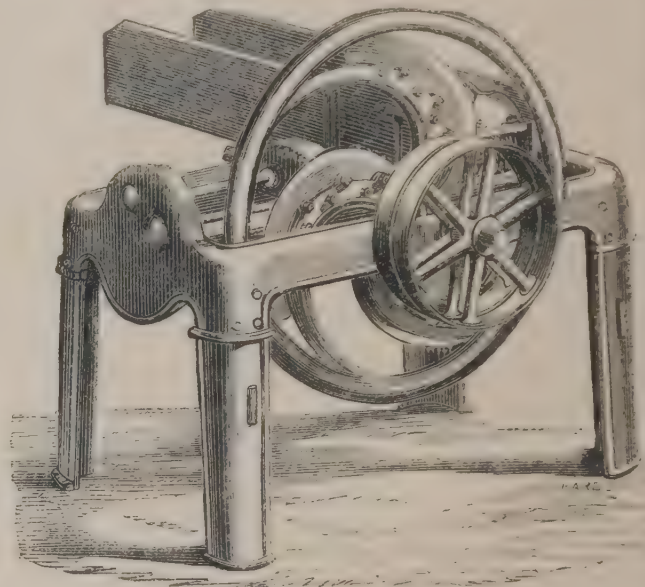
PATENT BAND SAW. The band or ribbon saw is passed over pulleys, and the table is of planed metal. It can be set for cutting wood at any angle or bevel.



BARRETT, EXALL, AND ANDREWES' HORSE GEAR.

A 6-HORSE POWER PATENT GEAR. The whole of the machinery self-contained in an iron cylinder, and adapted for communicating power for thrashing, sawing, pumping, &c.

PATENT GEAR WORK, adapted for working a chaff cutter by 1-horse power with or without an intermediate motion; by using the latter the speed is doubled.



BARRETT, EXALL, AND ANDREWES' CHAFF CUTTERS

CHAFF CUTTERS. The engraving represents a new and much improved series. The frames are of iron. The arrangement is simple, but very strong and effective; the working parts are protected; and they are adapted for manual, horse, and steam power.

GRAIN MILLS for crushing and splitting corn for horses and cattle. They will crush oats, barley, and linseed and split beans and peas, with a minimum expenditure of power, and are adapted for hand, horse, or steam power.

SCREW LIFTING JACKS, or cotton screws. They are simple and strong; the screws are of the best forged iron, turned and chased in the lathe, and a corresponding nut is cut in the head of the frame which carries the weight.

BARLEY AVELLER, made entirely of iron. The barley is passed through a cylinder, in the centre of which is a spindle armed with knives, which remove the beard and awn from the grain. It is adapted for hand-power.

OIL-CAKE MILL. It has two sets of teeth revolving towards each other, so shaped as to take a firm grip of the cake, and break it small or large, as may be desired.

FLOUR-DRESSING MACHINE. The cylinder is fitted with wires of different meshes, with brushes revolving inside of it; thus four or more divisions of the meal may be produced at pleasure.

SLUICE VALVES, for either steam, water, or gas. The raising screws are square threaded and engine-turned, working in gun-metal nuts. The surfaces are braced, both in the sliding gates and seats.

HAY-MAKING MACHINE. It has two motions, a forward one for spreading the grass, and a backward one for lifting or turning it when nearly made. It has a simple arrangement with instantaneous action, giving it the desired motion, as also for elevating and depressing the rake barrels.

PATENT LEVER HORSE RAKE, very strong, simple, cheap, and novel. The outside frame used in all other rakes is dispensed with, the teeth are supported up to the axle, whilst a movable cleaner works inside the teeth and descends as they rise. It has a simple adjustment for altering the depth of the teeth while the rake is at work.

GORSE MACHINE, which first cuts up the gorse like straw, and then crushes it between rollers running at different speeds. The prickles are completely destroyed, and the gorse reduced to a pulp fit for cattle food.

[2079]

BENTALL, EDWARD HAMMOND, *Heybridge, Maldon, Essex.*—Chaff cutters, corn and seed crushers, root pulpers, oil-cake mills. (*See pages 8 and 9.*)

[2080]

BEGBIE, JAMES, *Haddington, N.B.*—Adjustable sack holder and lifter; hand machine for sowing turnip seeds.

[2081]

BELL, GEORGE, *Inchmichael by Errol, Perthshire, N.B.*—Bell's reaping machine for two horses with patent sheaffer complete.

[2082]

BOBY, ROBERT, *Bury St. Edmunds, Suffolk.*—Machines for cleaning and separating grain, and improved wort pump for brewers. (*See page 10.*)

[2083]

BOOTHMAN, JAMES, *Gisburn Coates, near Skipton.*—Observatory bee-hive and feeding box, with ventilator for top.

[2084]

BOYD, JAMES, *Lewisham.*—Patent brush lawn-mower, self-cleaning, self-sharpening; shaft roller; tubular scythe handles.

[2085]

BROWN, WILLIAM, & CHARLES N. MAY, *North Wilts Foundry, Devizes.*—Portable steam engine, and patent sluice cock. (*See page 11.*)

[2086]

BURGESS & KEY, *London.*—Reaping, mowing, and thrashing machines, haymakers, horse rakes, carts, waggons, chaff-cutters, churns. (*See page 12.*)

[2087]

BURRELL, CHARLES, *St. Nicholas Works, Thetford, Norfolk, and 69, King William Street, City, London.*—Boydell's patent traction engine, &c. (*See pages 13 to 16.*)

[2088]

BUSBY IMPLEMENT COMPANY, THE, *Bedale, Yorkshire.*—Ploughs, horse hoes, carts, and turnip tailers, &c.

[2089]

CAMBRIDGE, W. C., *Bristol.*—10-horse engine, steam cultivating tackle, clod-crushers, chain harrows, zinc riddles, washing boards.

[2090]

CARSON & TOONE, *Warminster.*—Prize chaff engines, Moody's turnip-cutters, horse gears, horse hoes, and cheese presses.

[2091]

CHANDLER, ROBERT, *Old Ford, Bow, Middlesex.*—Models of patent steam-cultivating apparatus for ploughing any shaped field.

DOUBLE-CYLINDERED ENGINE of 8-horse power, 3-tined cultivator, with all requisite adjuncts. Price, complete £500 0

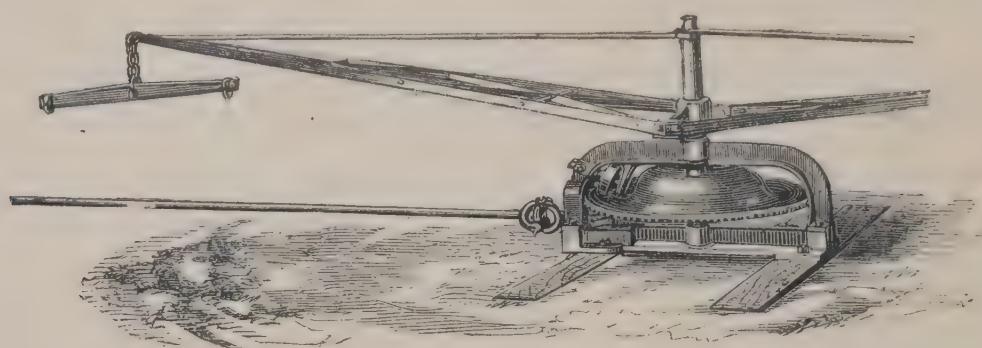
DOUBLE-CYLINDER ENGINE, 10-horse power, 5-tined cultivator. Inclusive price £550 0

DOUBLE-CYLINDER ENGINE, 12-horse power, 5-tined cultivator. Inclusive price £600 0

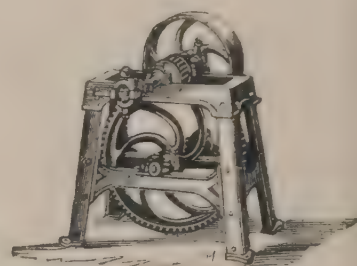
Separate WINDLASS, with 5-tined cultivator, without engine, complete. Price £200 0

Further information may be obtained by applying to the exhibitor.

BENTALL, EDWARD HAMMOND, *Heybridge, Maldon, Essex.*—Chaff cutters, corn and seed crushers, root pulpers, oil-cake mills.



HORSE GEAR H.W.B.



INTERMEDIATE MOTION I.M.A.

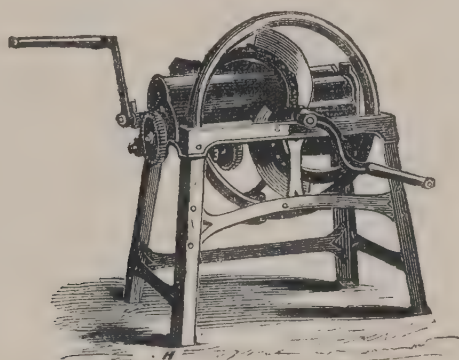
BENTALL'S PATENT HORSE GEARS.

Descriptive Mark.

H.W.A. 1-horse	£7 7 0
H.W.B. 2-horse	8 8 0
H.W.C. 3-horse	11 11 0
H.W.D. 4-horse	12 12 0

BENTALL'S IMPROVED THRASHING MACHINES.

Bentall's patent 1-horse gear, intermediate motion, thrashing machine, pulleys, &c.	£24 7 0
If fitted with travelling wheels and shafts	29 12 0
Bentall's patent 2-horse gear, intermediate motion, thrashing machine, and pulleys	27 10 0
If fitted with travelling wheels and shafts.	32 15 0
Bentall's patent 3-horse gear, intermediate motion, thrashing machine, and pulleys	34 6 6
If fitted with travelling wheels and shafts	41 13 6
Bentall's patent 4-horse gear, intermediate motion, thrashing machine, and pulleys	37 9 6
If fitted with travelling wheels and shafts	44 16 6



CHAFF CUTTER C.D.D.

BENTALL'S PATENT PRIZE CHAFF CUTTERS.

Descriptive Mark.

Fitted with cast-iron legs.

C.C.X. for hand power, 7 in. mouth, 2 knives	2 5 0
C.D.A. ditto 7½ in. ditto 2 ditto	2 12 6
C.D.C. ditto 8 in. ditto 2 ditto	3 13 6
C.N.C. ditto 8 in. ditto 2 ditto	4 4 0

Fitted with wrought-iron legs.

C.D.D. for hand power, 9 in. mouth, 2 knives	5 5 0
C.D.E. { for hand or } 9 in. ditto 2 ditto	6 6 0
C.D.H. { horse power } 9 in. ditto 3 ditto	7 7 0
C.D.I. { for horse } 11 in. ditto 2 ditto	8 8 0
C.D.K. { or steam } 11 in. ditto 3 ditto	9 9 0
C.D.P. { power } 13 in. ditto 3 ditto	11 11 0

Fitted on a wood frame with wrought-iron legs.

C.W.D. for hand-power, 9 in. mouth, 2 knives	4 14 6
C.W.K. { for horse } 11 in. ditto 3 ditto	9 9 0
C.W.P. { or steam } 13 in. ditto 3 ditto	11 11 0

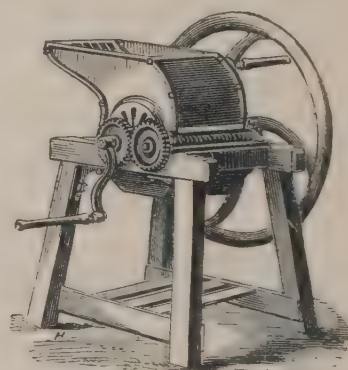
BENTALL'S INTERMEDIATE MOTION.

Descriptive Mark.

I.T.A. 1 and 2 horse, single gear	£2 2 0
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The following are fitted with brass bearings.

I.M.C. 1 and 2 horse, single gear	£3 3 0
I.M.D. 1 and 2 horse, double gear	4 4 0
I.M.A. 3 and 4 horse, single gear	3 13 0
I.M.B. 3 and 4 horse, double gear	4 14 0

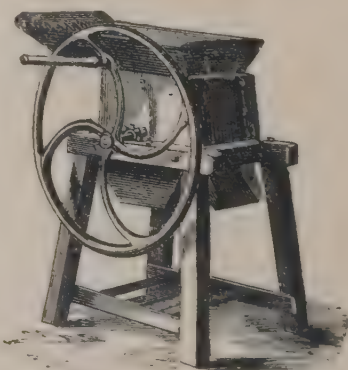


ROOT PULPER R.P.A.

BENTALL'S PATENT PRIZE ROOT PULPERS.

Descriptive Mark.

R.P.D. barrel 9 in. diameter, 10 in. long	£3 13
R.P.E. ditto 9 in. ditto 14 in. long	4 14
R.P.C. ditto 12 in. ditto 10 in. long	4 14
R.P.B. ditto 12 in. ditto 14 in. long	5 15
R.P.A. ditto 12 in. ditto 20 in. long	7 7



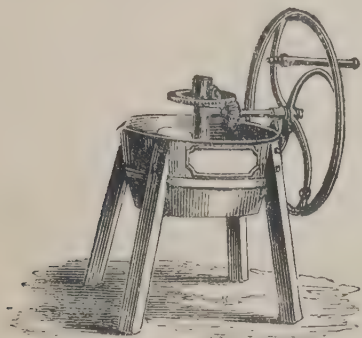
TURNIP CUTTER T.C.A.

BENTALL'S IMPROVED GARDNER'S TURNIP CUTTERS.

Descriptive Mark.

T.C.A. Gardner's turnip cutter as usually constructed	Price	£4 10
T.C.A. fitted with Bentall's patent spout for separating the dirt &c. from the sliced turnips		4 12

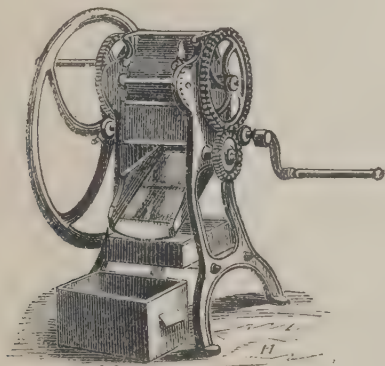
BENTALL, EDWARD HAMMOND, continued.



ROOT CUTTER R.C.A.

BENTALL'S PATENT ROOT CUTTERS.

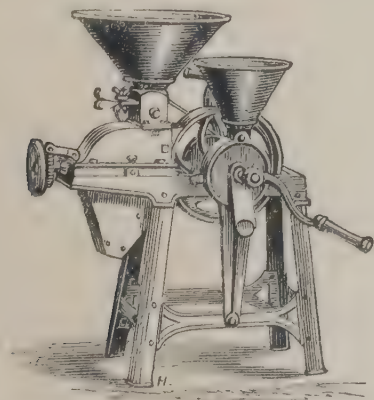
Descriptive Mark.	
R.C.A. to cut slices for beasts	£4 4 0
R.C.A. to cut slices for beasts and finger-pieces for sheep.	4 14 6



OIL-CAKE MILL O.C.E.

BENTALL'S IMPROVED OIL-CAKE MILLS.

Descriptive Mark.	
O.C.D. to break 1 size	£2 2 0
O.C.A. to break various sizes	3 3 0
O.C.C. to break various sizes, or to dust	4 14 6
O.C.E. for horse or steam power, to break the hardest kinds of cake to various sizes, or to dust	6 6 0



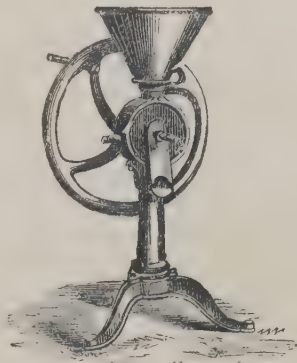
CORN AND SEED CHRUSHER R.S.A.

BENTALL'S PATENT PRIZE CORN AND SEED CRUSHERS.

Descriptive Mark.	
R.S.A. for hand power.	£5 5 0
Ditto, with bean kibbler attached	6 16 6
R.S.B. for horse or steam power	8 8 0
Ditto, with bean kibbler attached	10 0 0
R.S.C. for steam-power	12 12 0
Ditto, with bean kibbler attached	14 0 0

BENTALL'S PATENT UNIVERSAL MILL.

Descriptive Mark.	
U.M.A. adapted for kibbling oats, barley, beans, peas, Indian corn, &c.	£5 5 0

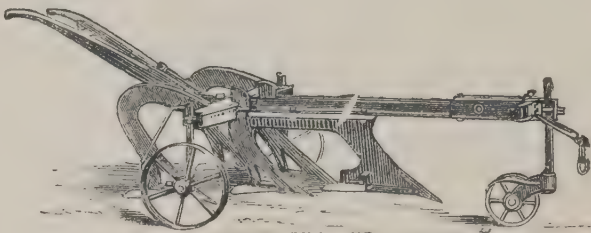


BEAN KIBBLER B.K.C.

BENTALL'S PATENT BEAN KIBBLERS.

Descriptive Mark.	
B.K.A. for hand-power.	£2 12 6
B.K.C. ditto	3 3 0

BENTALL'S IMPROVED DRESSING MACHINES. Prices, £6, £7, and £8 0 0



BENTALL'S BROADSHARE L.I.B.B.

BENTALL'S PATENT PRIZE BROADSHARE, CULTIVATOR, AND SUBSOIL PLOUGH.

Descriptive Mark.	
B.I.B.F. heavy subsoil plough	£4 4 0
B.I.B. 3-tined broadshare and subsoil	6 6 0
B.I.B.B. 5-tined ditto ditto	8 8 0
B.W.B. 3-tined ditto ditto wood beam	5 15 6
L.I.B.F. light subsoil plough	3 3 0
L.I.B.E. 3-tined broadshare and subsoil	5 15 6
L.I.B.B. 5-tined ditto ditto	7 7 0
L.I.B.C. 7-tined ditto ditto	8 8 0
L.I.B. 3-tined light broadshare	5 5 0
L.W.B. 3-tined ditto wood beam	4 14 6



PATENT PLOUGH E.H.B.

BENTALL'S PATENT WOOD-BEAMED PLOUGHS.

Descriptive Mark.	
E.H.A. fitted with curved handles, as a swing plough, including staff and coulter	£2 13 6
E.H.B. fitted with straight handles, as a swing plough	2 13 6
Ditto, fitted with 1 wheel	3 3 0
Ditto, fitted with 2 wheels	3 10 0
Shares, per dozen	0 6 6

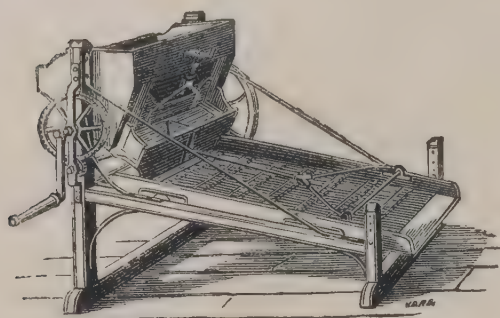
DYNAMOMETERS.

Bentall's traction dynamometer	£35 0 0
Bentall's rotary dynamometer	50 0 0

BOBY, ROBERT, *Bury St. Edmunds, Suffolk.*—Machines for cleaning and separating grain, and improved wort pump for brewers.

Has obtained and still holds the First Prize and Silver Medal of the Royal Agricultural Society of England, and 30 other First-class Prizes.

4,000 of these machines have been sold in 5 years.



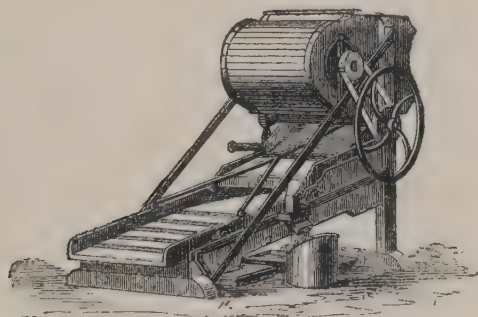
CORN SCREEN.

BOBY'S PATENT CORN SCREEN effectually separates all thin corns, stones, seeds, &c. from either barley, wheat, or sanfoin, and produces a sample that enables the merchant or farmer to obtain the highest market price for his corn.

To maltsters it is invaluable, as the duty on malt renders it necessary they should pay only on the best barley.

Screen No. 2, 50 bushels per hour . . .	£7 0 0
Screen No. 1, 90 ditto . . .	9 0 0
Stone separator, extra . . .	1 10 0
Screen No. 3, 150 bushels per hour . . .	15 15 0

Boby's Patent Screen successfully competed at Norwich, in 1860, against a new patent self-cleaning and adjustable rotary screen, and obtained the silver medal.



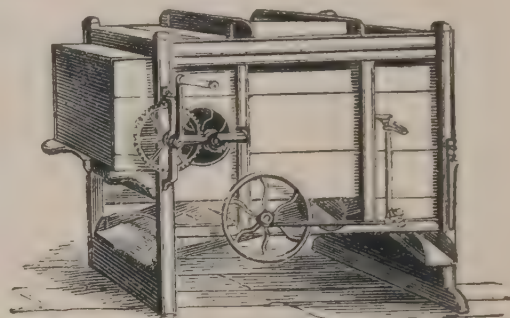
CORN SCREEN WITH BLOWER.

BOBY'S IMPROVED PATENT CORN SCREEN, with blower.

This is the original well-known screen, with a simple blower in front of the hopper, the blast from which acts upon the grain as it falls from the hopper to the screen. This blower is driven, with a very small additional power, from the screen spindle, and is thrown out of use with the greatest facility by removing the strap, and the screen can then be worked alone.

This addition is very important, as it enables parties to separate most of the grown kernels, with the further great advantage obtained by the fact that the thin or tail corn is as clean and free from dust, &c. as the head sample. R. B. with the greatest confidence recommends this machine to all who are interested in obtaining a faultless sample of corn.

Screen No. 5, will screen 50 bush. per hour	£10 10
Screen No. 6, ditto 90 ditto .	12 0
Extra separators to the above . . .	1 10
Screen No. 7, will screen 150 bush. per hour	20 15
Extra separator . . .	2 5
Extra pulley for power . . .	1 0

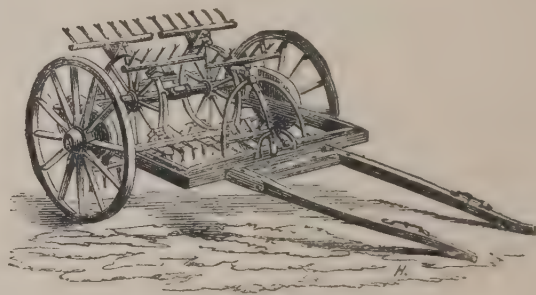


CORN-DRESSING MACHINE.

BOBY'S PATENT CORN-DRESSING MACHINE, with patent screen combined, enables any farmer or merchant to produce a sample of wheat or barley that will command the very highest price, as all the chaff, seeds, thin corns, &c. are effectually separated from the bulk.

Corn leaving a single-blast thrashing machine, has only to pass through Boby's dressing machine once, and a perfect separation will be found to have been made.

Price	£15 0 0
Dressing machine, with all the advantages of the above, but without patent screen	10 0 0



HAY-MAKING MACHINE.

BOBY'S NEW PATENT DOUBLE-ACTION HAY-MAKING MACHINE.

The inventor has effected everything in the above which is accomplished by any other implement of its kind, notwithstanding he has discarded more than 30 per cent. of the parts which usually compose them. In addition to this, the arrangement is such, that the revolving forks being placed a greater distance behind the carriage wheels, the weight of the machine has passed over the grass before the fork comes in contact with it, at the same time effecting a balance which leaves little or no weight on the back of the horse.

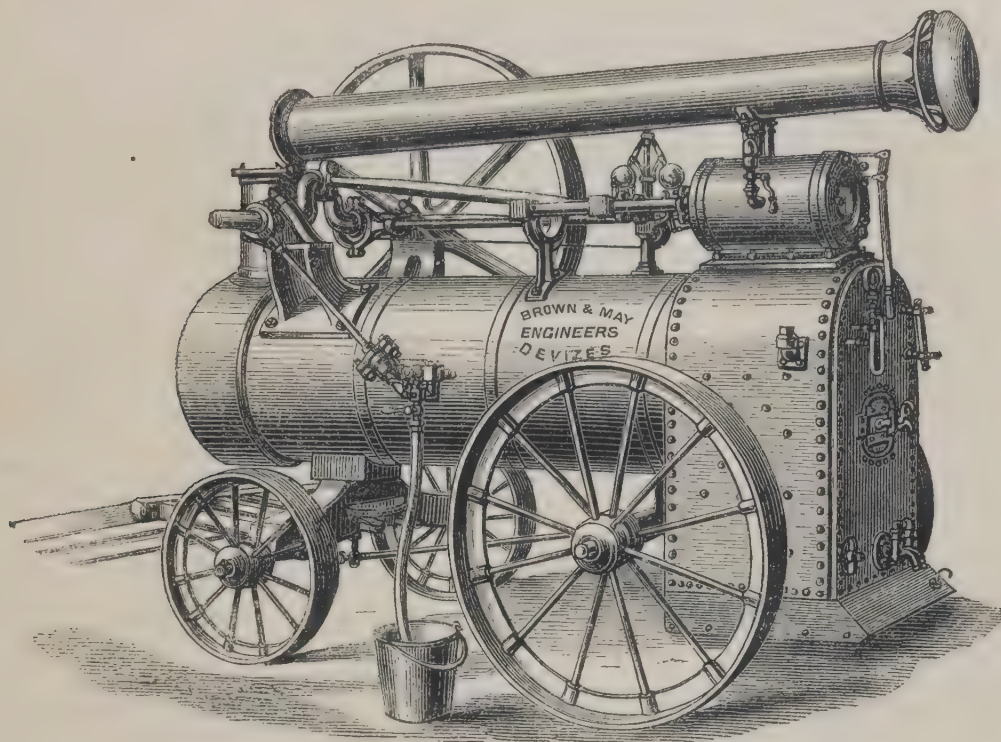
Amongst other advantages may be named its very ready and easy adjustment, the great facility with which its action can be reversed, coupled with the greatly diminished power required to draw it, and the simplicity with which every part of it can be removed or lubricated and kept free from dirt, while it is impossible for it to choke.

The manufacturer offers to the public an implement which is at once lighter in weight, stronger in its parts, less likely to get out of order, and requiring less horse-power than any in the market.

Price	£13 13
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Catalogues will be sent post-free on application.

BROWN, WILLIAM, & CHARLES N. MAY, *North Wilts Foundry, Devizes.* London Agent: S. HOLMAN, 18, *Cannon Street.*—Portable steam engine, and patent sluice cock.



PORTABLE STEAM ENGINE.

EIGHT-HORSE POWER PRIZE PORTABLE STEAM ENGINE.

The accompanying woodcut represents an improved first-prize portable steam engine, which for simplicity, compactness, and economy in consumption of fuel, is not surpassed.

Among the many advantages this engine possesses over others, the following may be mentioned :—

The arrangement of the cylinder, being enclosed in a belt or jacket of steam, is kept, when working, at a high temperature, and thus the maximum advantage of using steam expansively is attained. All danger from fracture, through ice in the cylinder in frosty weather, is also obviated ; the ice melting as the steam gets up.

The lower part of the cylinder casting forms a steam chamber, from which the driest steam is taken off, directly into the valve case, without exposure to the cold air ; this is very important, as condensation and the liability to prime is thereby obviated.

The cylinder and all the working parts are fixed on the top of the boiler, as shown in engraving, so as to be well under the eye of the driver. The advantage of this arrangement must be obvious to all.

The simplicity of the arrangement is such, that any part is easy of access, in case of derangement, without interfering with or removing another.

The engine is furnished with an inside crank, which works between the bearings, so that the fly-wheel can be put on either side of the boiler, or a pulley of smaller dimensions fixed on its opposite side. One end of the shaft is also prolonged to fix a coupling on, for direct

connexion with a windlass for steam cultivation or other purposes.

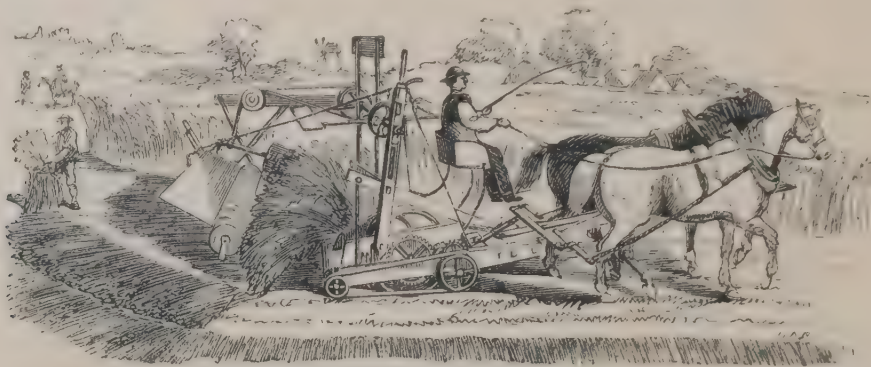
An improved patent steam-pressure gauge, without which no engine is complete, is furnished on every engine ; as well as a glass water-gauge, and gauge cocks of superior make, and a Salter's spring balance to safety valve.

The whole of the working bearings are of the best gun-metal, the guide bars are steel, and all working pins, as well as the nuts and screws, which are subject to much use, are case-hardened.

The boiler is made on the most improved plan to ensure durability and economy, together with as large an amount of heating surface as possible, upwards of 20 square ft. being allowed for each horse-power. The whole of the fire box is constructed of the best Lowmoor iron, or may be had of steel if preferred, at the same cost. The tubes are by the best makers, and are of such a length as to ensure no waste heat being emitted up the chimney. The barrel of the boiler is covered with a casing of hair felt and wood, and over all a covering of sheet iron, which gives a neat and finished appearance to the whole, and adds considerably to the facility of cleaning as well as economy in working.

The ash pan is fixed close round the fire box and fitted with a door which can be used as a damper, thus giving the driver full control over his fire. All live coals or cinders are also effectually prevented from falling out on the ground, so that the engine may be worked with the greatest safety even amongst straw or shavings.

BURGESS & KEY, *London*.—Reaping, mowing, and thrashing machines, haymakers, horse rakes, carts, waggons, chaff-cutters, churns.



PRIZE REAPING MACHINE.

Obtained the Council Medal at the Great Exhibition of 1851.

First prize consisting of 1,000 francs, a gold medal, and a great gold medal of honour, at Fougereuse, near Paris, both in 1859 and 1860.
First prize at Goes, in Holland, in competition with Cuthbert's and Wood's.
First prize of the Highland Society, at Edinburgh.
First prize of the Yorkshire Society, at Hull.
First prize of the Lincolnshire Society, at Great Grimsby.
First prize of the North Northumberland Society.
First prize of the Hexham Society, at Haydon Bridge.
First prize of the Kent Society, at Ashford.
First prize of the Lancashire Society, at Southport.
Great gold medal of honour at Schwerin, and numerous other prizes and medals.
Royal Agricultural Society of England's first prize of £30, 1855. Ditto, £15 prize at Chelmsford, 1856.
First prize at Louth.
First prize at Hexham.
First prize of Highland Society's medal, at Lord Kinnaird's, Rossie Priory, North Britain.
Royal Agricultural Society's first prize, at Salisbury.
Australian medal of the Geelong Agricultural Society.

Austrian medal, at Vienna.

First-class diploma, at Pesth, Hungary.

First-class diploma, at Grosseto, Tuscany.

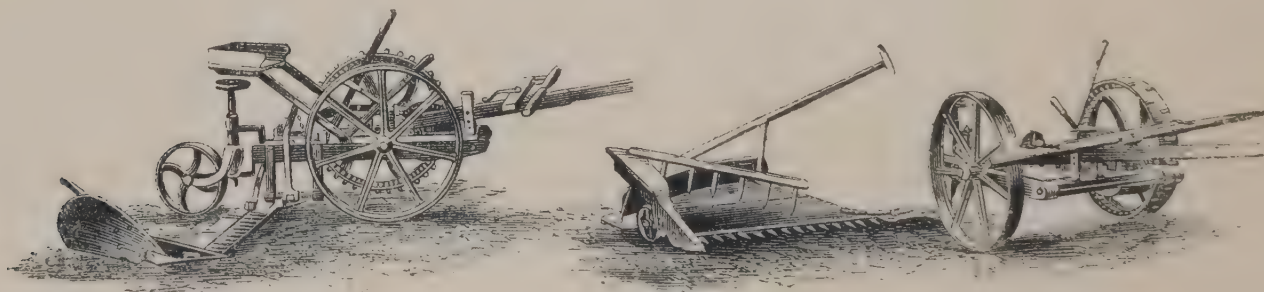
North Lancashire Agricultural Society, first prize and gold medal.

First-class diploma of the Central Society of Belgium, open to all nations.

BURGESS & KEY'S PRIZE REAPING MACHINE was introduced at the great Exhibition of 1851. Since that time it has been made entirely self-acting, and will now both cut and deliver the corn. In its improved form it has won the highest prizes and testimonials in all parts of the world.

The great advantage and superiority of Burgess & Key's screw-delivery reaper is fully attested by the enormous demand and use. They are in use on the royal farms in the United Kingdom, and on the Continent on the farms of the Emperor of the French, the Emperor of Russia, the Queen of Spain, the Grand Duchess Helena of Russia, the Grand Duke of Tuscany, Baron Ricasoli, Count Orloff Davidoff; and upwards of 3,000 are in use in the United Kingdom by the nobility and leading agriculturists.

Price £42 10



PRIZE MOWER AND COMBINED REAPING MACHINE.

BURGESS & KEY'S NEW PATENT MOWING MACHINE, adapted to cut all kinds of grasses, any required height; both wheels are geared and so placed that they do not travel on the cut grass; the driver can raise the knife so as to avoid obstruction, and the finger beam and knife are hinged so as to turn up when travelling along roads. It will cut about 1 acre of grass per hour.

This new machine is the result of 13 years' experience in the manufacture and use of reaping and mowing machines. During this time numerous prizes have been received by Burgess & Key for mowers, including the first prize of the Royal Agricultural Society of England at Canterbury and Warwick. They have also received the first prize

of £40 on 2 occasions in Holland, in competition with machines from all parts of the world. Numerous other prizes have also been received in various parts of the United Kingdom. It is a most simple and durable machine, and can be fully relied upon in the harvest field, as the greatest care is taken in its manufacture to ensure its working well. Price £25 as a mower.

The following are also exhibited :—

Horse rakes of superior construction.

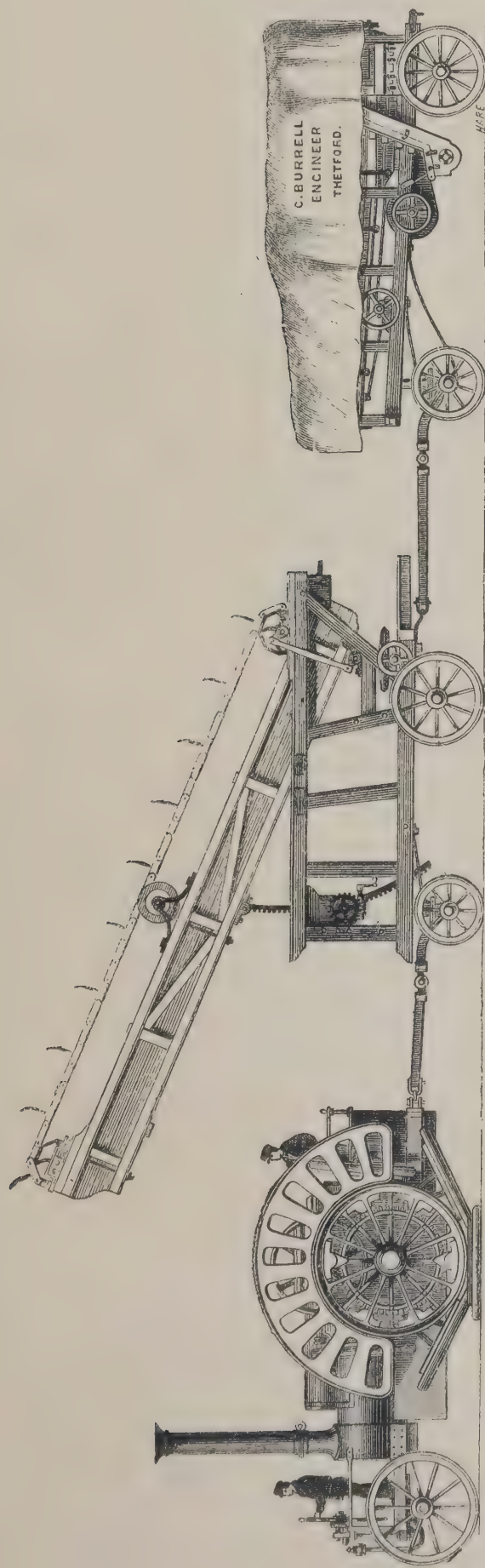
Anthony's patent American churn, of which upwards of 10,000 have been sold.

Chaff-cutters of the very best description.

Turnip cutters; pumps and fire engines.

Lawn mowers; thrashing machines.

BURRELL, CHARLES, *St. Nicholas Works, Thetford, Norfolk, and 69 King William Street, City, London.*—Boydell's patent traction engine and endless railway, Fowler's patent steam ploughing apparatus, portable steam engines, combined and finishing thrashing machines, patent straw elevator, single and double corn mills, chaff machines, &c.



BOYDELL'S TRACTION ENGINE DRAWING A TRAIN OF THRASHING MACHINERY.

BOYDELL'S TRACTION ENGINE. This engine will draw heavy loads over soft sandy, rough, or hilly roads, or over country where no road exists. When not required for traction purposes, it is available for steam ploughing, as well as for every purpose to which an ordinary portable engine can be applied.

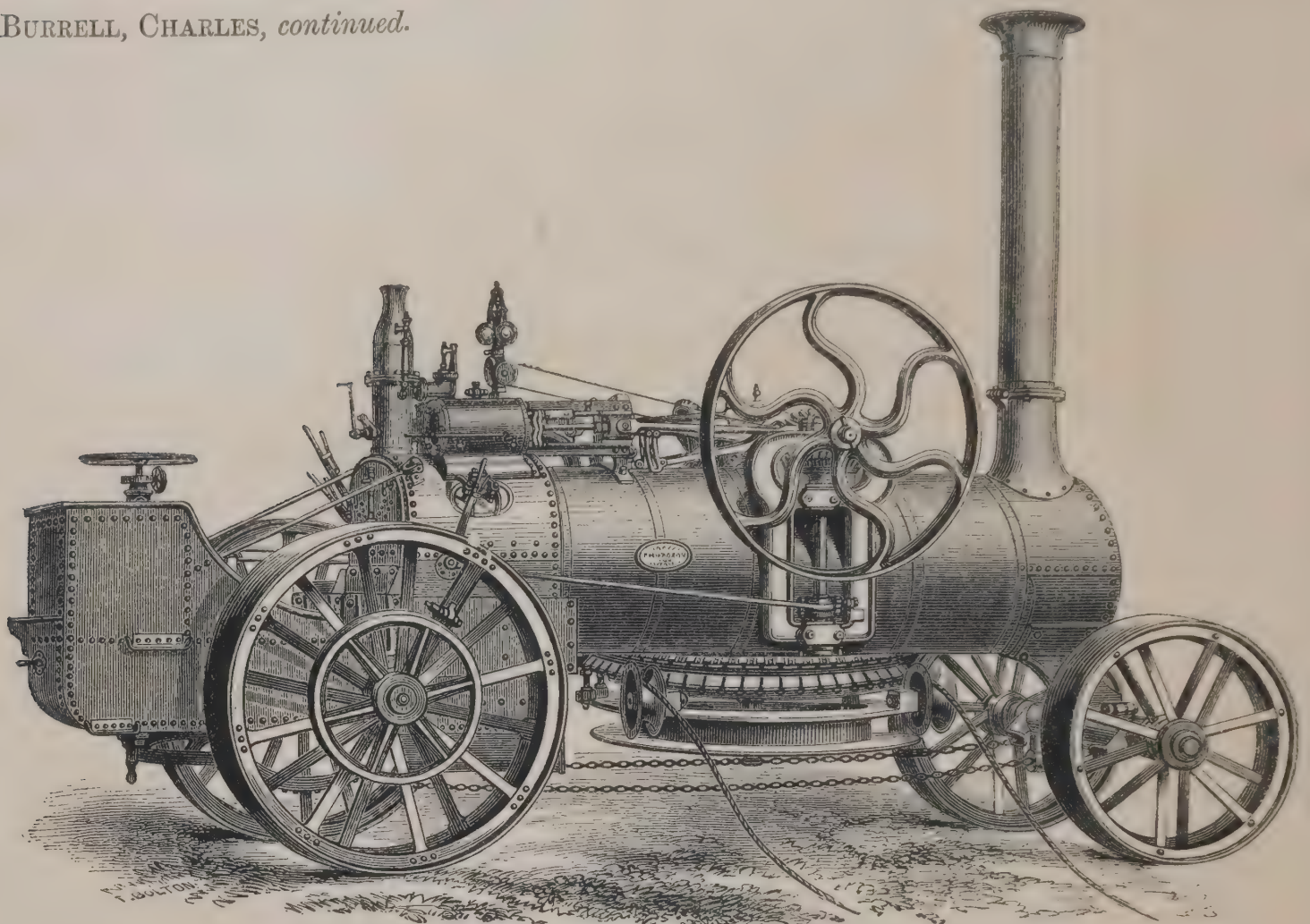
Price of 10-horse power traction engine, with steering apparatus complete	£750 0
Price of thrashing machine with second dressing apparatus	115 0
Ditto ditto with patent reciprocating screen, and second dressing apparatus	120 0
Ditto patent straw elevator, to take the straw from the machine, and deliver it at any angle	59 0

CHARLES BURRELL is the patentee and original manufacturer of the steam-power thrashing and dressing machines, and he exhibited the first of these machines at the Royal Agricultural Society's Show at York, in 1848; since which time he has directed his attention principally to the improvement of this class of machinery, and portable engines, and has so laid out his manufactory as to be enabled to produce work of the highest quality, and to execute orders with unusual promptness and accuracy.

Illustrated and descriptive catalogues, with numerous testimonials from agriculturists of high standing, and others who have used his engines and machinery, will be forwarded on application.

Orders or enquiries from English, foreign, or colonial houses addressed to the London offices or the Works will be promptly attended to, and estimates supplied with weights, measurements, and prices, inclusive or exclusive of packing and shipping charges, and delivered free to any dock in London, or any seaport in England or elsewhere.

BURRELL, CHARLES, *continued.*

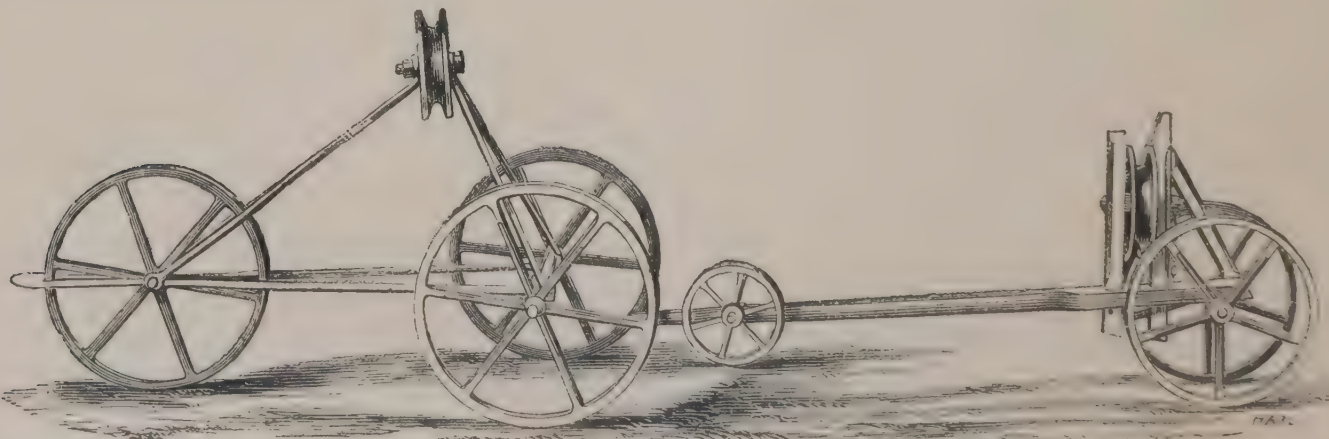


ENGINE AND WINDLASS COMBINED.

This engine is so constructed that any parts requiring to be removed can be taken off when the steam is up, the fastenings being quite independent of the boiler. The windlass consists of a single sheave 5 ft. in diameter, round which the rope takes *half* a turn. The groove into which the rope passes is formed of a double series of small leaves, which on the least pressure clasp and hold the rope until it takes the straight line on the other side, when the clips freely open and liberate it. By this simple appliance all crushing and short bends, which are so detrimental to the profitable use of wire rope, are entirely avoided; this, coupled with the fact that on each passage of the implement the rope is only bent twice, and then only round large diameters, will at once show this system of using wire rope to be most advantageous. The small leaves are made of chilled cast-iron, which is not liable to much wear, but when worn can be replaced at a trifling cost. The power is conveyed to the windlass by an upright shaft from the crank shaft.

PLAN OF WORKING.—On the headland is the engine and windlass, and directly opposite to them the anchor, which is self-moving, and between these the plough is pulled backwards and forwards, one end of the plough being alternately in the air and the other in its work, thus avoiding the necessity of turning at the headlands. The plough being constructed with patent slack gear, the rope is lengthened or shortened as the irregularity of the field requires, and at the same time both ropes are kept sufficiently tight to prevent them from trailing on the ground, by which means a great saving of draught is effected, the wear and tear (which must necessarily follow from the rope running on the ground) is entirely avoided without the least diminution of the power of the engine.

Any implement the farmer may deem it expedient to use may be substituted for the plough with a few modifications.

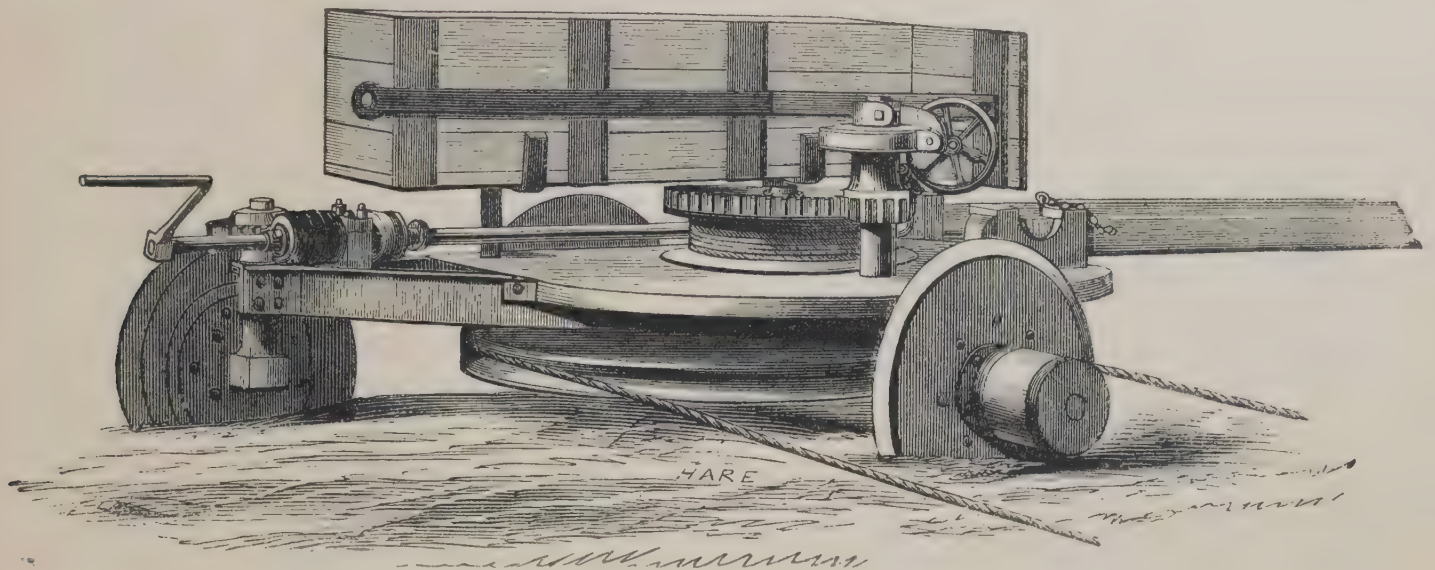


ROPE PORTERS.

These porters are placed along the fields at intervals of 40 yards, thereby keeping the rope entirely off the ground.

The outside ones are mounted on 3 wheels, so as to allow them to be moved by the rope.

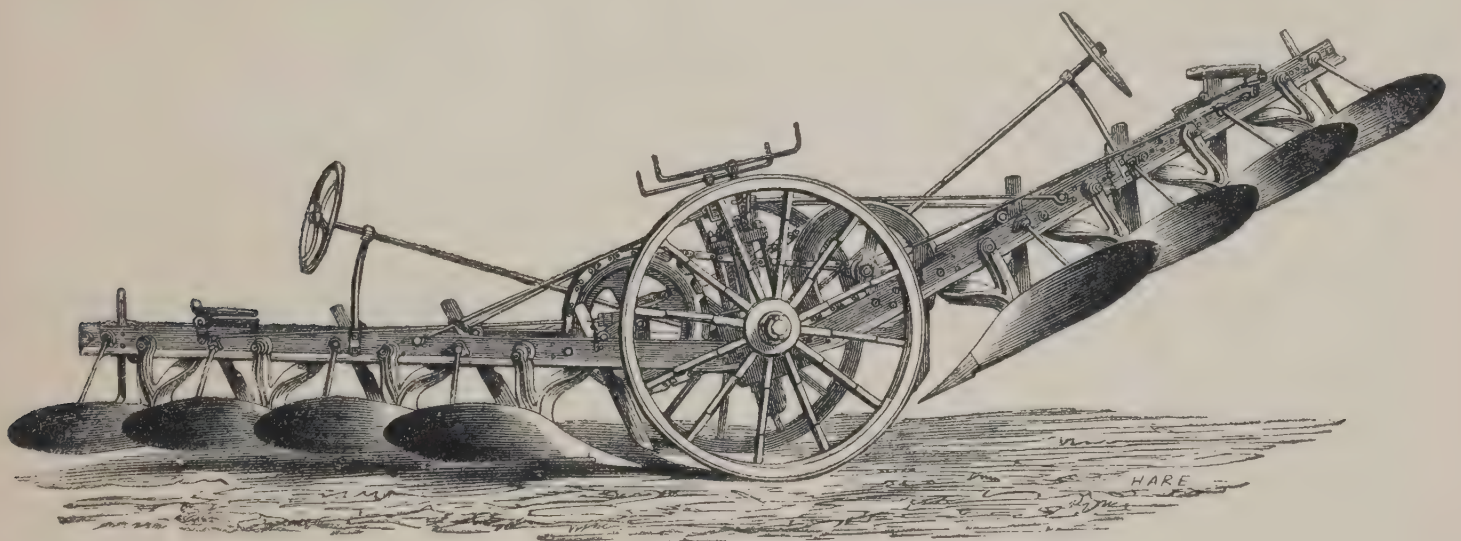
BURRELL, CHARLES, *continued.*



PATENT ANCHOR.

This anchor is made to resist the side strain of the implement worked, by the cutting into the ground of the disc wheels, and it is moved along the headland at pleasure, by the motion of the 5-ft. sheave, which is turned by the ploughing rope, and as the plough goes away from the anchor, the sheave winds up a rope stretched along the headland, and keeps the anchor

opposite its work. The frame is made entirely of wrought iron. The steering of the disc enables it to be worked along a crooked headland. The box at the back is intended as a counterpoise to prevent the anchor being pulled over when doing very heavy work. This machine is managed by a boy, who also attends to shifting of rope porters.



PATENT BALANCE PLOUGH AND CULTIVATING MACHINE.

The above engraving represents the BALANCE PLOUGH AND CULTIVATING MACHINE, made of iron, and adjustable to different widths of furrow. The plough bodies and coulters are fixed on a bevel beam, and by altering their positions along the beam in either direction, a wider or narrower furrow is cut at pleasure, at the same time retaining the rigidity of a riveted frame which is so essential to the durability of a steam-going implement. A great many operations can be performed by this implement without much alteration being necessary. By removing the ordinary mould boards used for surface ploughing, and substituting short ones for scarifying, a tillage can be effected quite equal, if not superior, to digging, and leaving the land in a most desirable state for the action of the atmosphere. From the shares and mould boards being attached on the outside of the beam, all choking in very foul land is entirely obviated—a harrow can also be attached and drawn behind the plough if desired by the farmer. It can also be fitted with tines for cross cultivating.

10-horse set of ploughing and cultivating apparatus complete, consisting of engine with self-moving gear and windlass, a

self-moving anchor and grappling anchor, 800 yards best quality steel rope, headland ropes, 18 rope porters, and snatch block, 4-furrow plough with scarifiers attached

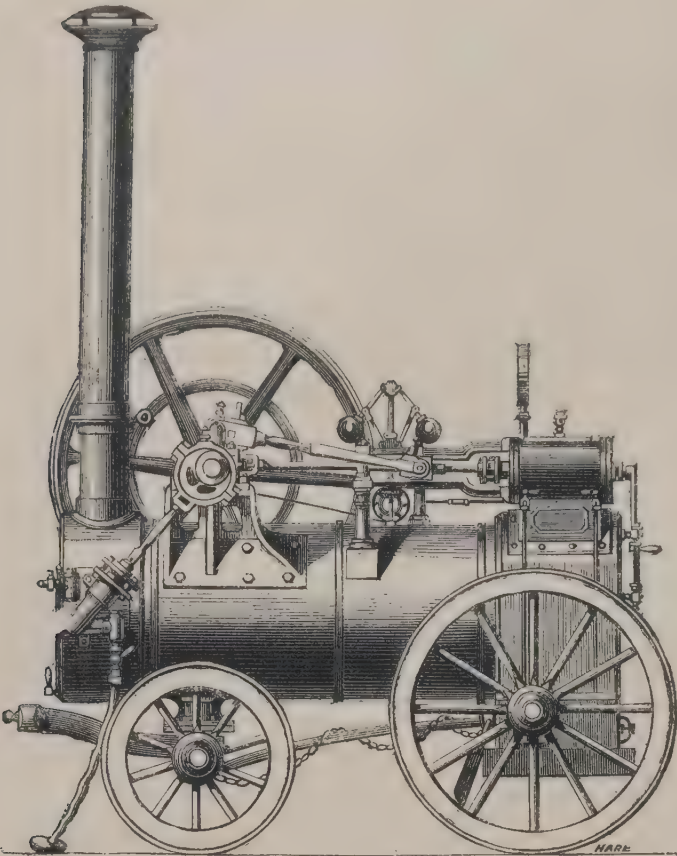
£780	0
12-horse set, ditto	825 0
14-horse set, ditto	875 0

PLOUGHING APPARATUS for attaching to ordinary portable engines of not less than 8 or 10 horse power.

8 or 10 horse self-moving windlass, a self-moving anchor and grappling anchor, 18 rope porters, 800 yards steel rope, headland ropes, and snatch block, 3 furrow plough with scarifiers attached £365 0

8-horse power stationary windlass and ploughing apparatus, complete, consisting of driving shaft and windlass for engine, 2 self-moving anchors, 2 grappling anchors, 1,000 yards steel rope, headland ropes, and snatch block, 2 or 3 furrow plough, with scarifiers attached . . . 271 0

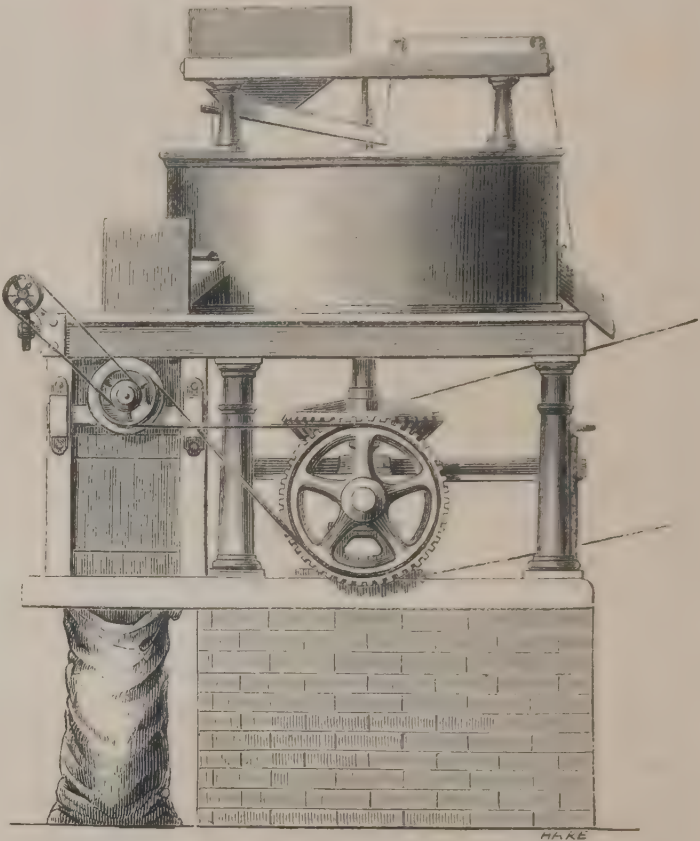
BURRELL, CHARLES, *continued.*



PORTABLE STEAM ENGINE.

C. BURRELL'S PORTABLE STEAM ENGINES, of the most simple and approved construction, combining lightness and compactness with great strength and durability.

4-horse power, with cylinder 6½ in. diam.	£165	0
5 ditto 7 ditto	180	0
6 ditto 7¾ ditto	200	0
7 ditto 8½ ditto	215	0
8 ditto 9 ditto	230	0
10 ditto 10 ditto	270	0
10-horse power, with 2 cylinders	290	0
12 ditto ditto	335	0
14 ditto ditto	375	0



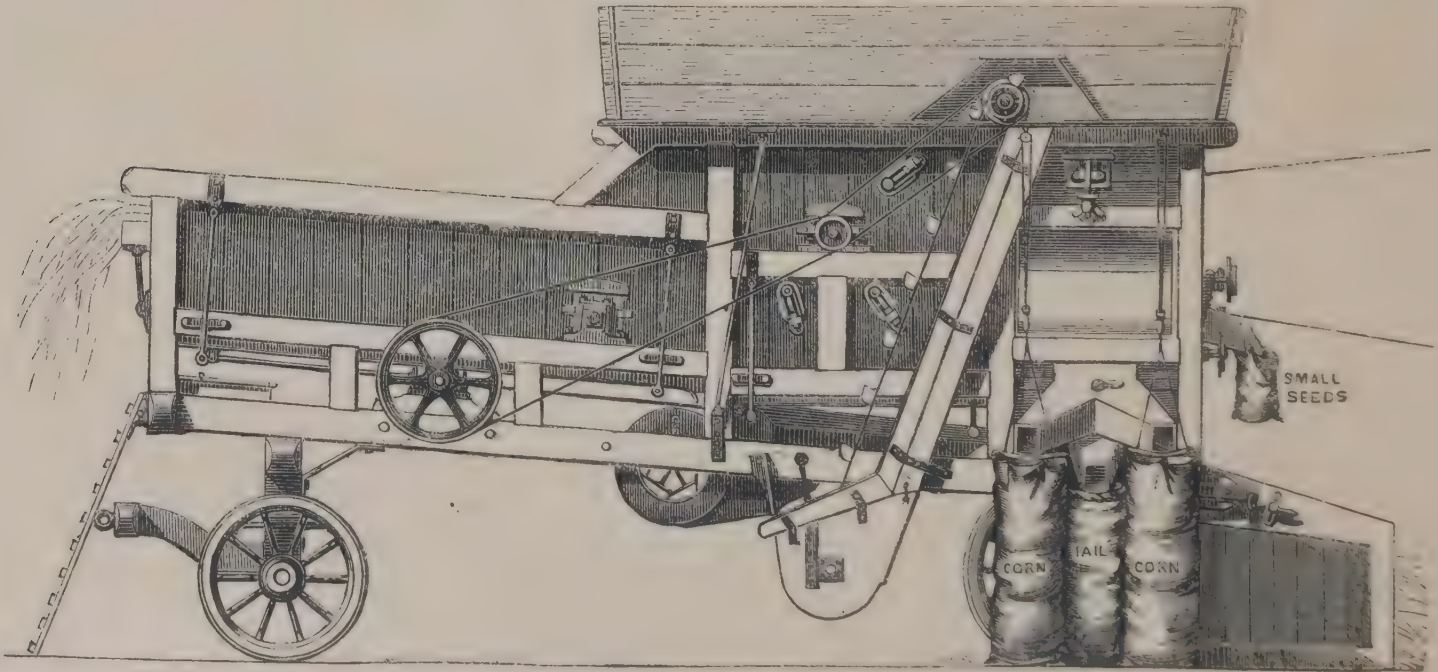
SINGLE FLOUR MILL, WITH DRESSING APPARATUS.

C. BURRELL'S IMPROVED SINGLE MILL, for grinding corn and dressing flour for household purposes at one operation.

With French burr stones, 36 in. diam.	£70	0
Ditto ditto 42 ditto	85	0
If with Derbyshire stones, £10 less.		

C. BURRELL'S IMPROVED PORTABLE DOUBLE CORN MILL, with dressing machine, mounted on a strong and suitable carriage, and fitted with wheels and shafts for moving from place to place. This mill is invaluable on large occupations, or in thinly populated districts.

Complete, as above, with 2 pairs of French burr millstones, 42 in. diameter	£165	0
Complete, as above, with 2 pairs of French burr millstones, 48 in. diameter	180	0



BURRELL'S IMPROVED THRASHING MACHINE.

With patent reciprocating screen, and second dressing apparatus . . . £120 0

[2092]

CHILDS, A. B., & OWEN, 481 *New Oxford Street*.—Grain separator, combining the action of the blast, riddles, and exhaust.

AMERICAN CORN OR FLOUR MILL SEPARATOR, combining the action of the blast, riddles, and exhaust. The most perfect machine extant.

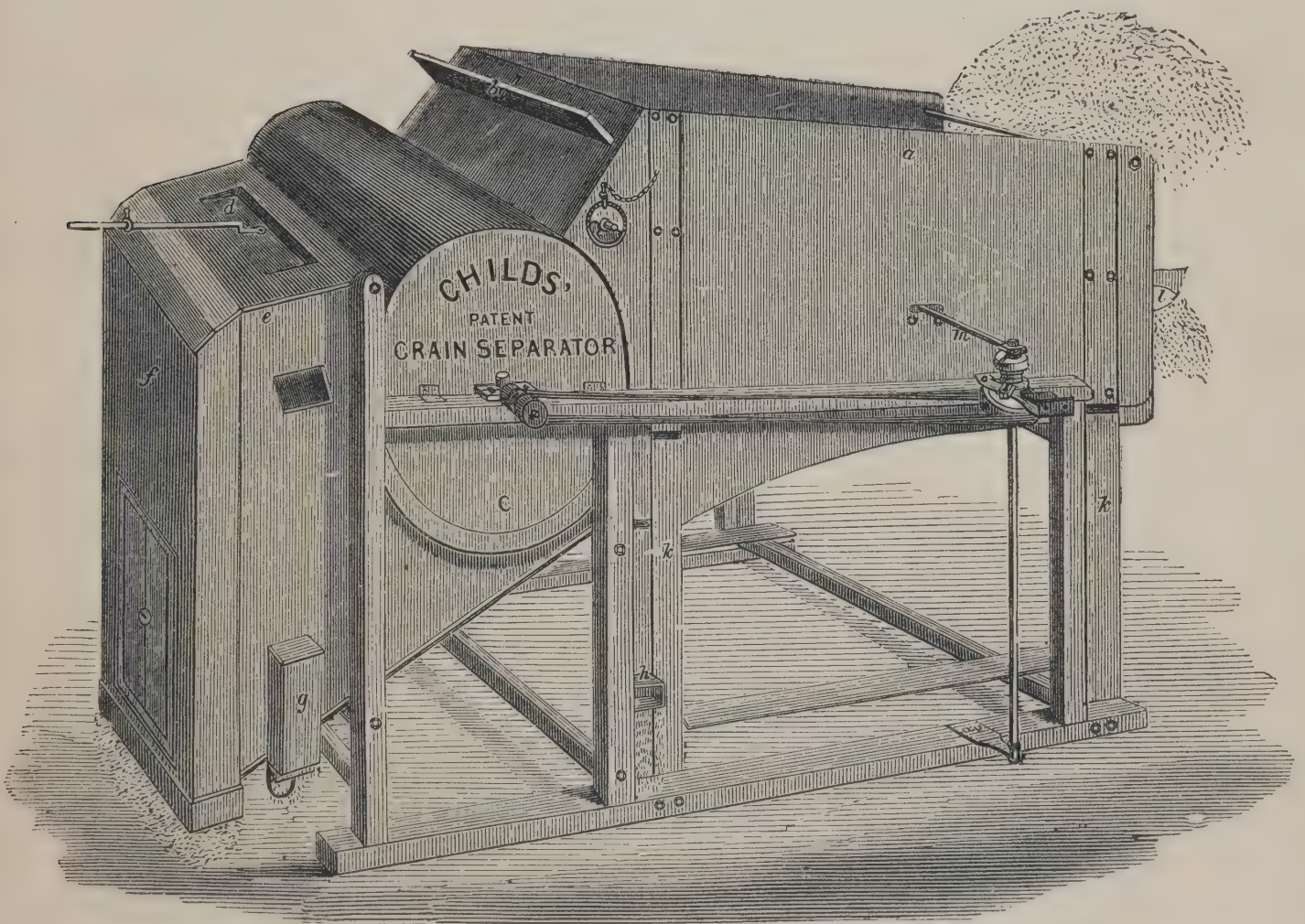
Over 6,000 now in operation.

The flour miller of all others is most interested in this separator, owing to the large amount of grain he is constantly using. From vast competition, both at home and abroad, his profits are of necessity small, therefore his great aim should be to manufacture the sack of flour, from the least possible amount of wheat, and still preserve the quality. In thus giving the quantity with the quality,

the grain must be clean, and the cleaner the better, as it enables him to grind much more closely without specking the flour.

Corn factors, maltsters, brewers, farmers, and distillers, who have either water or steam as a motive power, will find its adoption of importance in proportion to their trade or traffic.

It first separates the corn according to bulk or size, by the means of the riddles and blast combined; and finely, by the exhaust, when every kernel of corn is weighed in air, and a division made agreeable to its weight or specific



AMERICAN CORN OR FLOUR MILL SEPARATOR.

gravity. The operator is enabled to carry this division to an extreme nicety, from the simple though perfect means of regulating the machine, and thus remove all the imperfect, viz. sprouted, mouldy, shrunken, and weevil-eaten corn, the smut ball (without bursting), cliver, harriß seed, oats, garlic, cockle, &c.

The power required is merely nominal, being only sufficient to revolve the fan, and give the riddles a lateral motion.

Gentlemen calling at the office by appointment, can see the machine in operation.

LIST, &c. OF GRAIN SEPARATORS.

Size or No. of Machine.	Capacity or No. of bushels per hour.	Motion of fan per minute.	Diameter of driving pulley on machine.	Price of machine.
No. 1	200 to 400	525	9 in.	£70
No. 2	100 to 150	630	6 in.	50
No. 3	50 to 75	660	4½ in.	40
No. 4	30 to 50	700	4½ in.	30
No. 5	20 to 30	425	6 in.	20

The above machines delivered free upon the rail at Norwich.

[2093]

CLAY, CHARLES, *Stennard Iron Works, Wakefield, Yorkshire*.—Clay's patent cultivator and horse hoe.

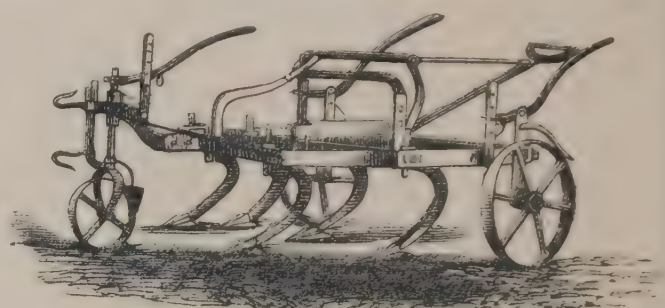
Obtained Prize at the, Paris Exhibition, and also from the Royal Agricultural Society.

1. PATENT HORSE-POWER CULTIVATOR. The tines of this implement are raised backward, as in a horse-rake.

Price, ranging according to the number of tines, from £6 5s. to £12 0

2. PATENT HORSE HOE. In this implement by a very simple arrangement, the width of cut can be instantly varied during the progress of the horses. Price £2 5 Chain harrow, 15s. extra.

3. CLAY'S PATENT STEAM-POWER CULTIVATOR. £40 0



PATENT CULTIVATOR.

[2094]

CLAYTON, SHUTTLEWORTH, & Co., *Stamp End Works, Lincoln*.—Steam ploughing and cultivating machinery, &c. (*See pages 20 to 23.*)

[2095]

COLEMAN & SONS, *Chelmsford*.—8-horse power steam engine and apparatus for cultivation cultivator, potato digger, and clod crusher. (*See page 19.*)

[2096]

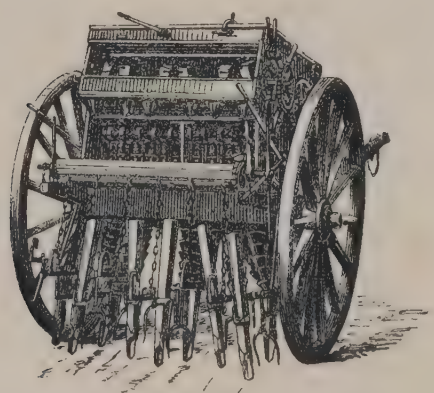
COMINS, J., *South Molton, Devon*.—Self-cleaning clod crusher, set of drags, horse hoe, paring plough.

[2097]

CORNES, JAMES, *Barbridge Works, Nantwich*.—Prize chaff cutters.

[2098]

COULTAS, JAMES, JUN., *Perseverance Iron Works, Spittlegate, Grantham*.—Royal prize general purpose, and corn and seed drills, and horse hoe.



DRILL FOR GENERAL PURPOSES.



CORN AND SEED DRILL.

6-FT. 6-IN. 12-ROW GENERAL PURPOSE DRILL.

Price £39 0
With fore carriage steerage, £4 10s. extra.

The following highly valuable awards have been made for the above drills, showing an amount of success and increasing appreciation rarely obtained by any manufacturer. At the Royal Agricultural Society's Meeting, Leeds, 1861:—

The first prize of £10 for the best corn and general purpose drill.

The first prize of £10 for the best corn, seed, and root drill.

The first prize of £5 for the best general purpose drill for small occupations.

The first prize of £6 for the best drill for turnips and other roots.

6-FT. 6-IN. 12-ROW CORN AND SEED DRILL.

Price £25

The first prize of £7 for the best drill for small seed and rye grass.

Small occupation corn and seed drill, highly commended.

Manure distributor, highly commended.

In addition to which he has received a silver medal and 18 first prizes at other exhibitions in the short space of 5 years.

JAMES COULTAS JUN.'S IMPROVED HORSE HOE is the most efficient implement manufactured, being adapted for all kinds of corn and root crops, at any distance
6-row general purpose £7 1

CLASS IX.—*West Side of Eastern Annex.*

COLEMAN & SONS, *Chelmsford*.—8-horse power steam engine and apparatus for cultivation cultivator, potato digger, and clod crusher.

Coleman's Prize Cultivator has obtained upwards of 50 First Prizes, including the Prize Medal at the Great Exhibition, 1851.



PRIZE CULTIVATOR.

COLEMAN'S PATENT PRIZE CULTIVATOR combines in one implement the broadshare, grubber, and cultivator, and is the most efficient implement of its class for both spring and autumn work.

No. 5.	Price	£7 0
No. 6.	Price	7 15
No. 9, with side levers.	Price	13 0

COLEMAN & SON'S IMPROVED HANSON'S PATENT POTATO DIGGER will raise potatoes cleaner, and with greater

economy, than any other implement, and without injury to the crop. Price £18 0

COLEMAN'S PATENT JOINTED CLOD CRUSHER accommodates itself to the undulations of the ground. From the peculiar construction of its discs it is admirably adapted for abrading the surface of the soil, rolling young wheats, &c. and preventing the ravages of the wire worm. Price £20 0



CLOD CRUSHER.

As Her Majesty's Commissioners were not able to allot to Messrs. Coleman sufficient space for a set of steam cultivating apparatus (Yarrow & Hilditch's patent), it is not exhibited. It may be seen, however, at the Royal Agricultural Society's Show in Battersea Park.

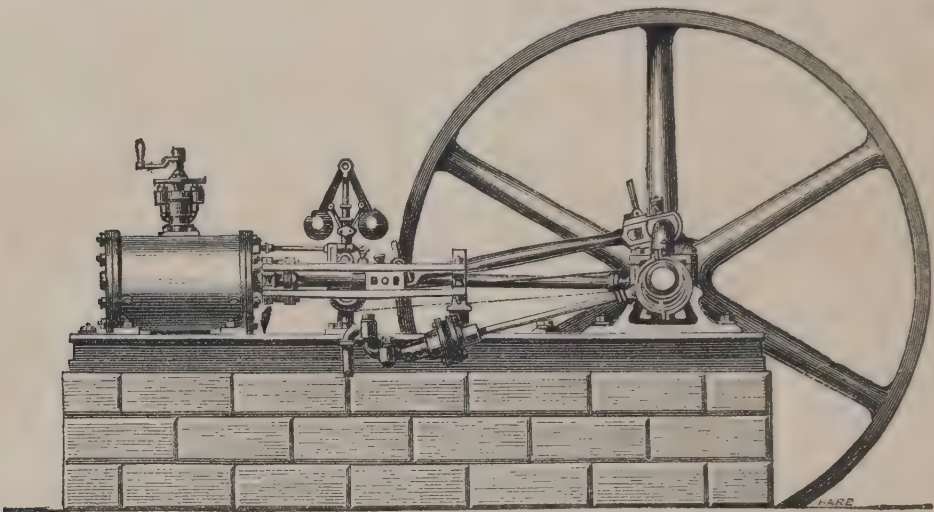
Among the advantages of this system are the following:—

1. Direct action; no power being wasted by the use of pulleys between the implement and the engine.
2. Economy in first cost, and in expense of working.
3. The engine, being locomotive, can draw the entire set of tackle upon the roads, and is at the same time adapted for the general uses of a steam engine upon the farm.

Price lists will be forwarded post-free on application,

CLASS IX.—*Agricultural and Horticultural Machines and Implements.*

CLAYTON, SHUTTLEWORTH, & Co., *Stamp End Works, Lincoln; 78 Lombard Street, London; 125 Weiszgärber, Vienna; and Gegenüber dem Bahnhof, Pesth.*—Steam ploughing and cultivating machinery; portable steam engines for agricultural purposes; ditto for contractors, pumping and winding, &c.; ditto for sawing and general purposes; improved horizontal non-condensing fixed engines; improved combined thrashing and winnowing machinery; iron-framed mills for grinding all kinds of grain; flour-dressing machines; circular-saw tables; rack benches for large timber; improved pumping machinery; loam and mortar mills, &c. &c.



FIXED HORIZONTAL STEAM ENGINE.

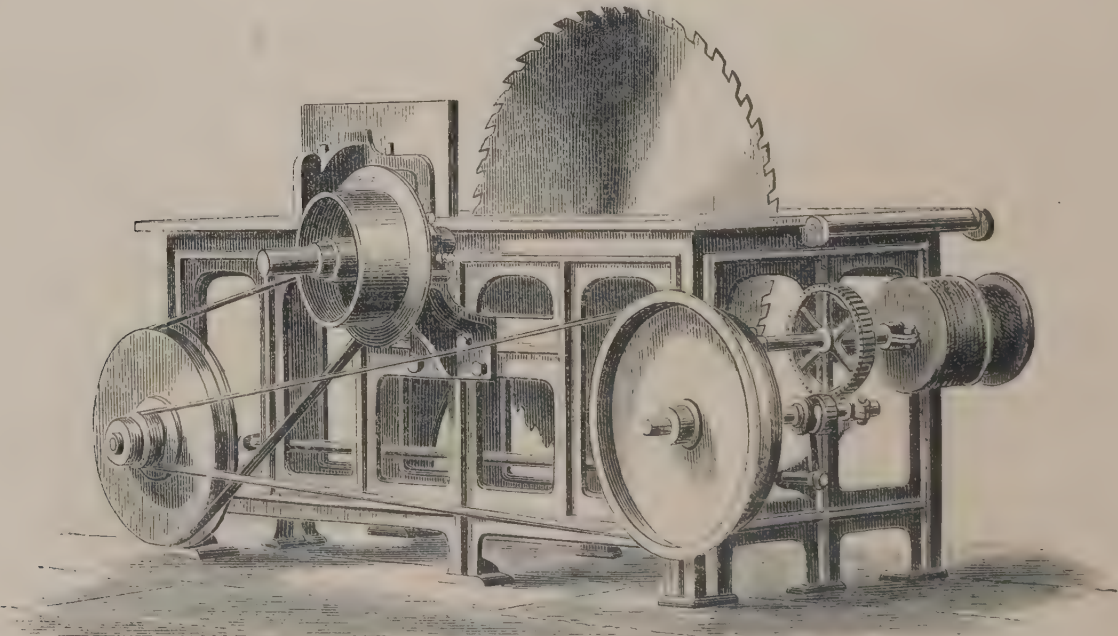
Obtained a Prize Medal at the Great Exhibition, 1851; First Prize at the Royal Agricultural Society's Meeting, &c. &c.

FIXED, HORIZONTAL NON-CONDENSING HIGH-PRESSURE STEAM ENGINE, complete, with governors, starting valve, feed pump, fly wheel with turned-up rim, ample size, improved Cornish boiler with steam chest, furnace, safety valves, gauge cocks, blow-off cocks, connecting pipes, and every requisite to make same complete. Price, if in England, including man's time fixing :—

4-horse power complete £120 0

6-horse power complete	. . . . .	£160 0
8 ditto ditto	. . . . .	200 0
10 ditto ditto	. . . . .	240 0
12 ditto ditto	. . . . .	280 0
14 ditto ditto	. . . . .	320 0
16 ditto ditto	. . . . .	360 0
20 ditto ditto	. . . . .	440 0

Link motion reversing gear if required.



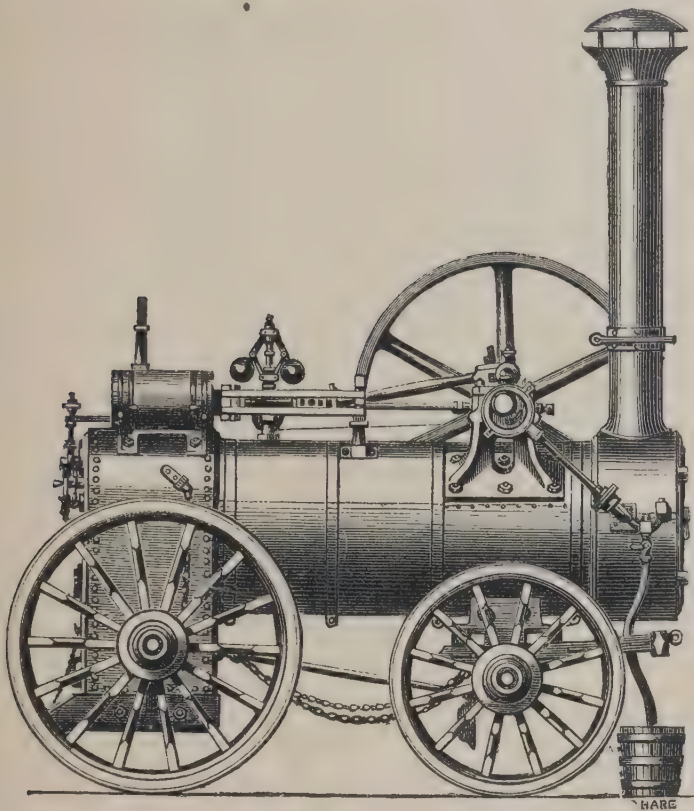
SELF-ACTING SAW TABLE.

IMPROVED CIRCULAR-SAW TABLES.

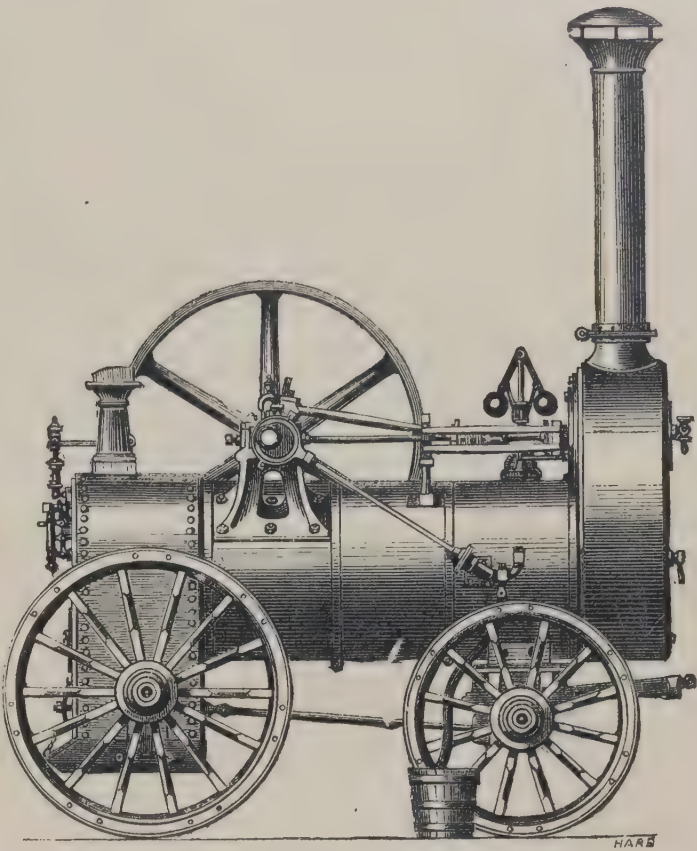
Saw table, 24-in. saw	£15 0
Ditto 30-in. saw	20 0
Set of boring tools	1 10

Improved saw bench, 42-in. saw	£45 0
Self-acting ditto, complete	65 0
Set of trucks and railways	25 0
Improved rack bench	160 0

CLAYTON, SHUTTLEWORTH, & Co., continued.



IMPROVED OUTSIDE CYLINDER PORTABLE ENGINE.



PATENT PORTABLE STEAM ENGINE.

CLAYTON, SHUTTLEWORTH, & Co.'s IMPROVED PORTABLE STEAM ENGINES FOR AGRICULTURAL PURPOSES, CONTRACTORS' USE, &c. &c.

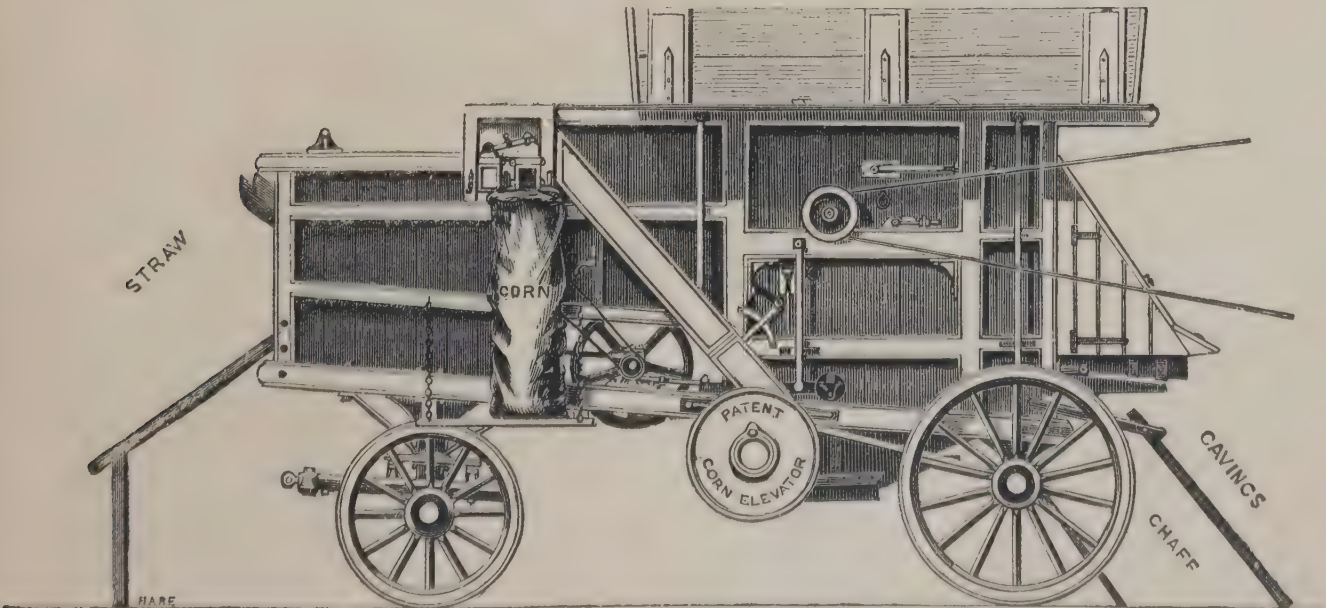
Improved Portable Steam Engine.

4 horse power	£165	0
5 ditto	180	0
6 ditto	200	0
7 ditto	215	0
8 ditto	230	0
8 horse power, 2 cylinders	250	0
10 ditto 1 cylinder	270	0
10 ditto 2 cylinders	290	0
12 ditto 2 cylinders	335	0
14 ditto ditto	375	0
16 ditto ditto	415	0
18 ditto ditto	455	0
20 ditto ditto	495	0

4 horse power	£170	0
5 ditto	185	0
6 ditto	205	0
7 ditto	220	0
8 ditto	235	0
8 horse power, 2 cylinders	255	0
10 ditto 1 cylinder	275	0
10 ditto 2 cylinders	295	0
12 ditto ditto	340	0
14 ditto ditto	380	0
16 ditto ditto	420	0
18 ditto ditto	460	0
20 ditto ditto	500	0

Link motion reversing gear, £10 to £20 extra.

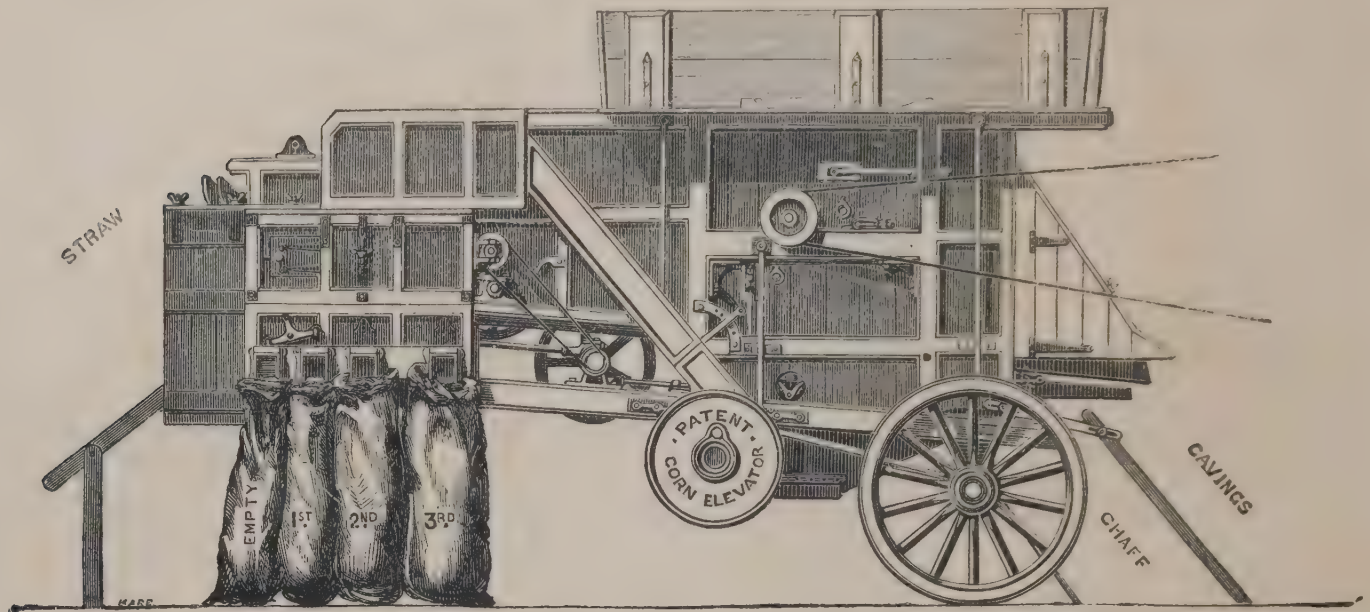
CLAYTON, SHUTTLEWORTH, & CO.'S PATENT STEAM-POWER THRASHING MACHINERY.



IMPROVED COMBINED THRASHING AND WINNOWING MACHINE.

CLAYTON, SHUTTLEWORTH, & Co., *continued.*

CLAYTON, SHUTTLEWORTH, & CO.'S PATENT STEAM THRASHING MACHINES.



IMPROVED PATENT COMBINED THRASHING, WINNOWER, AND DRESSING MACHINE.

CLAYTON, SHUTTLEWORTH, & Co.'s IMPROVED COMBINED THRASHING AND WINNOWER MACHINE, with new patent elevator, single blast. Price £100 0

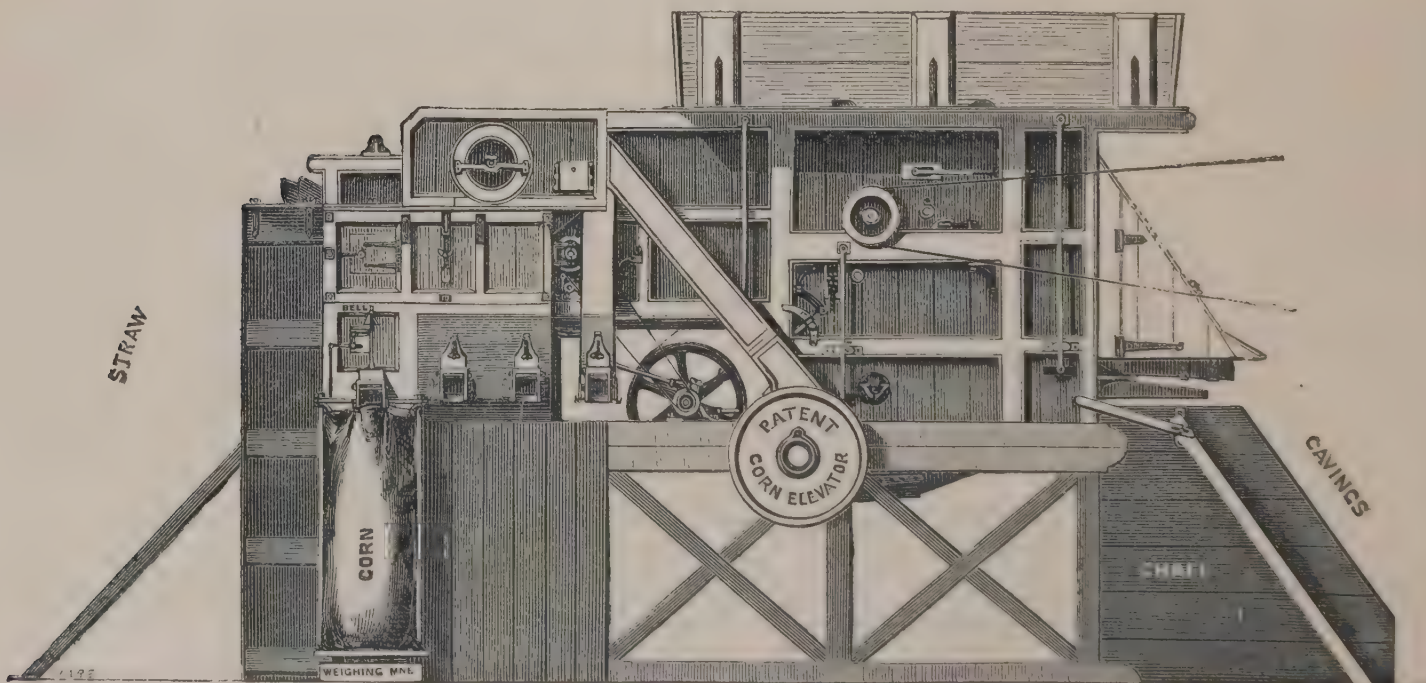
Clayton, Shuttleworth, & Co.'s improved patent combined thrashing, winnowing, and dressing machine, which thrashes the corn from the straw, dresses and cleans the same, and puts it in sacks ready for market.

Price, complete, with wood wheels and oil box, axles, drum 4 feet 6 in. wide, fitted with shafts or pole, and with a waterproof cloth cover £110 0

CLAYTON, SHUTTLEWORTH, & Co.'s IMPROVED FIXED COMBINED THRASHING, WINNOWER AND DRESSING MACHINE, with supporting frame, long spindle, and bearing, &c. Price, complete £118 10

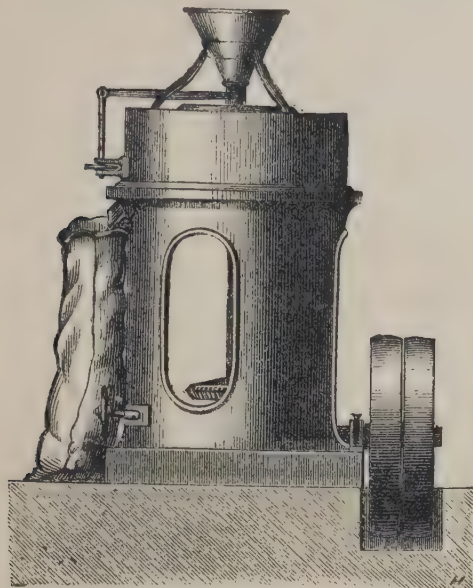
Obtained first prizes at the Paris Exhibition of 1855; Royal Agricultural Shows at Lewes, Gloucester, Lincoln, Carlisle, and Chester; also the Yorkshire Shows, Bath and West of England, &c. &c.

The new patent corn elevator renders these machines perfect in their simplicity, thus dispensing with 6 driving pulleys, and 3 driving bands.



IMPROVED FIXED COMBINED THRASHING, WINNOWER, AND DRESSING MACHINE.

CLAYTON, SHUTTLEWORTH, & Co., *continued.*

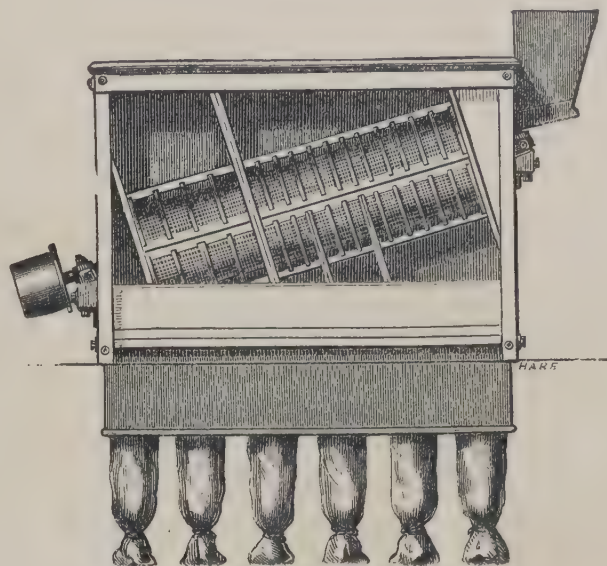


IMPROVED IRON-FRAMED CORN MILL.

IMPROVED IRON-FRAMED CORN MILL, complete with driving pulley, and ready for immediate use.

Derby stones, 2 ft. 8 in.	£40	0
Ditto 3 ft.	55	0
Ditto 3 ft. 6 in.	65	0
Ditto 4 ft.	80	0
French bed, 2 ft. 8 in.	45	0
Ditto 3 ft.	60	0
Ditto 3 ft. 6 in.	70	0
Ditto 4 ft.	85	0
French bed and runner 2 ft. 8 in.	50	0
Ditto ditto 3 ft.	65	0
Ditto ditto 3 ft. 6 in.	75	0
Ditto ditto 4 ft.	90	0

Fast and loose pulleys 50s. extra.



IMPROVED FLOUR-DRESSING MACHINE.

IMPROVED FLOUR-DRESSING MACHINE, with mahogany cylinder, including driving pulley.

Small, 12-in. cylinder	£25	0
Middle, 15-in. ditto	35	0
Large, 18-in. ditto	45	0
Crane for lifting runner stones	6	0
Complete set of tools for dressing millstones	4	10

Drawings and full particulars may be obtained on application.

CLAYTON, SHUTTLEWORTH, & Co.'s IMPROVED LOAM AND MORTAR MILL, which may be readily fixed and removed, and worked by an ordinary portable engine.

The pan is 5 ft. in diameter; and the two rollers are 3 ft. in diameter and 11 in. thick, giving an effective pressure of 50 cwt. on the material to be ground. The whole is firmly fitted and connected, and fixed on a timber frame. Scrapers are fitted to the vertical spindle, and every appliance is added to render this machine complete. The number already in use proves its efficiency.

Price	£85	0
For timber framing	5	0

CLAYTON, SHUTTLEWORTH, & Co.'s IMPROVED STRAW ELEVATOR (James Hayes, patentee).

Admirably adapted for taking the straw from the end of the shaker, when worked in conjunction with a portable thrashing machine. It absorbs very little power, and can be worked in any direction, varying from a straight line to right angles with the shaker. It is calculated to save the labour of 3 men, being capable of carrying the straw to a height of 20 ft. and upwards.

For straight delivery.

4 ft. 6 in. wide, 18 ft. long	£43	0
Ditto 20 ditto	48	0
Ditto 22 ditto	53	0

For delivery at any angle.

4 ft. 6 in. wide, 18 ft. long	£54	0
Ditto 20 ditto	59	0
Ditto 22 ditto	64	0

If fitted with wooden travelling wheels (which are strongly recommended), £5 extra.

CLAYTON, SHUTTLEWORTH, & Co.'s IMPROVED DOUBLE-BARREL PUMPS, for steam power.

These pumps are adapted for irrigation, or for pumping liquid manure in large quantities. They are intended to be worked by steam power (portable or fixed), and are capable of discharging 150 gallons per minute. They require no intermediate machinery, but may be worked direct, by a belt from a pulley fixed upon the engine fly-wheel shaft. The whole is fixed upon a strong iron frame, supported by two metal standards fitted with carriages and brasses. They have gutta-percha ball-valves, glands bushed with gun-metal, and an air vessel.

Price	£50	0
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[2099]

CRANSTON, W. M., 58 *King William Street, London Bridge*.—Grass mowing machine, Wood's patent.

[2100]

CROSS, THOMAS WELLS, & Co., *Washington Works, Leeds*.—Square and oval garden engines.

[2101]

CROSSKILL, A. & E., *Beverley*.—Improved clod crusher ; farm railway and trucks ; machine-made wheels ; improved carts and waggon.

[2102]

CROSSKILL, W., the Trustees of, *Beverley Iron Works, Beverley, Yorkshire*.—An assortment of prize agricultural implements. (*See pages 26 to 29.*)

[2103]

CROWLEY, MESSRS., & SONS, *Newport Pagnell, Bucks*.—General purpose cart ; model cart steam plough and apparatus.

[2104]

CUTHBERT, ROBERT, & Co., *Newton-le-Willows, Bedale*.—Patent reaping machines.

[2105]

DENNIS, T. H. P., *Chelmsford, Essex*.—Patent metallic horticultural building, or glazed structure. (*See page 25.*)

[2106]

DORE, JOHN, 17 *Exmouth Street, Clerkenwell, London*.—Garden watering, rolling, and syringing machine, with registered spreader.

[2107]

DOWNIE, ROBERT, SEN., *Barnet, Hertfordshire*.—Improved open bee-hive and unicombed case, a substitute for bell glasses.

[2108]

DRAY, TAYLOR, & Co., 4 *Adelaide Place, London Bridge*.—Patent tubular iron gates.

[2109]

DRAY, W., & Co., *Farningham, Kent*.—Reaping machine, with drop platform.

[2110]

DRUMMOND, P. R., *Perth*.—Land-cleanser, which gathers, lifts, and carts stones, felt, corn, &c. without hand.

[2111]

EATON, JOHN, *Thrapstone*.—Patent turnip thinner and horse hoe combined ; circular sheep-crib, lifting jacks, &c.

[2112]

FENN, ROBERT, *Rectory, Woodstock*.—Bee-hive, adapted for cottagers, on the depriving system without destroying the bees.

It was said by Dr. Johnson, that "the next best to knowing a thing was to know where to find it." Those who are desirous of becoming acquainted with an economical system of bee-keeping, will find one set forth in Nos. 639, 652 (*old series*), and 4, 10, 21, 22, 29, 39, 40, 42, 43, 46 (*new series*), of the *Journal of Horticulture, Cottage Gardener, and Country Gentleman*, published at 162 Fleet Street, E.C.

DENNIS, T. H. P., *Chelmsford, Essex.*—Patent metallic horticultural building, or glazed structure.



METALLIC HORTICULTURAL BUILDING.

PATENT METALLIC HORTICULTURAL BUILDINGS, manufactured by T. H. P. Dennis, horticultural builder and hot-water engineer, High Street, Chelmsford.

These buildings are constructed of iron, and by the introduction of malleable fittings, the several parts are brought together with such facility as to overcome the only obstacle hitherto existing to their universal adoption.

The cost of these structures will defy competition even by the perishable wooden houses, whilst in increased strength and durability, shadowless frames, and illimitable forms, their advantages are so obvious, that they cannot fail to secure the patronage of those who require the highest order of conservatory, or the useful and profitable forcing house. They are all correctly fitted previous to leaving the Works, and can be erected by an ordinary mechanic in a few hours (screws and bolts being entirely dispensed with), by which the undesirable lengthened presence of workmen is obviated. Their extreme portability is of no small advantage, and however long they may have been fixed, their removal and re-erection can be accomplished without injury to any of the framing. They can be transmitted as low-rated freight. Provision for their extension has been carefully studied, and can be accomplished without alteration to any existing structure.

Every front light can be made to open and swing upon

the mullion of the house, and the roof ventilation has no limits.

The condensed water from the roof is carried outside the building, thereby preventing the decay which follows when it is allowed to accumulate upon the eaves plate.

Every one is now supposed to be aware that glazed iron roofs, judiciously arranged, have not the least tendency to break the glass, and for those who still have this erroneous impression, the patentee wishes to explain that the most evident causes of fracture arise either from the glazier extending the laps of the glass so far upon the preceding square, that in cold weather ice is formed to such an extent, from the quantity of moisture necessarily retained, as to break the glass by its expansion, or from the bars of which the roof is composed being so irregularly spaced that the glazier is often compelled to introduce the glass with the bars on either side pressing tight against it, thus causing fracture, whilst other panes necessarily fall short of the width, and certain leakage is the result. These well known evils have been successfully overcome by the application of distance pieces between the bars, by which each glass-space is rendered equidistant from top to bottom and throughout any extent of surface, ensuring a water-tight and perfect roof.

Several of the parts are arranged so that iron roofs can be applied to wooden structures when preferred.

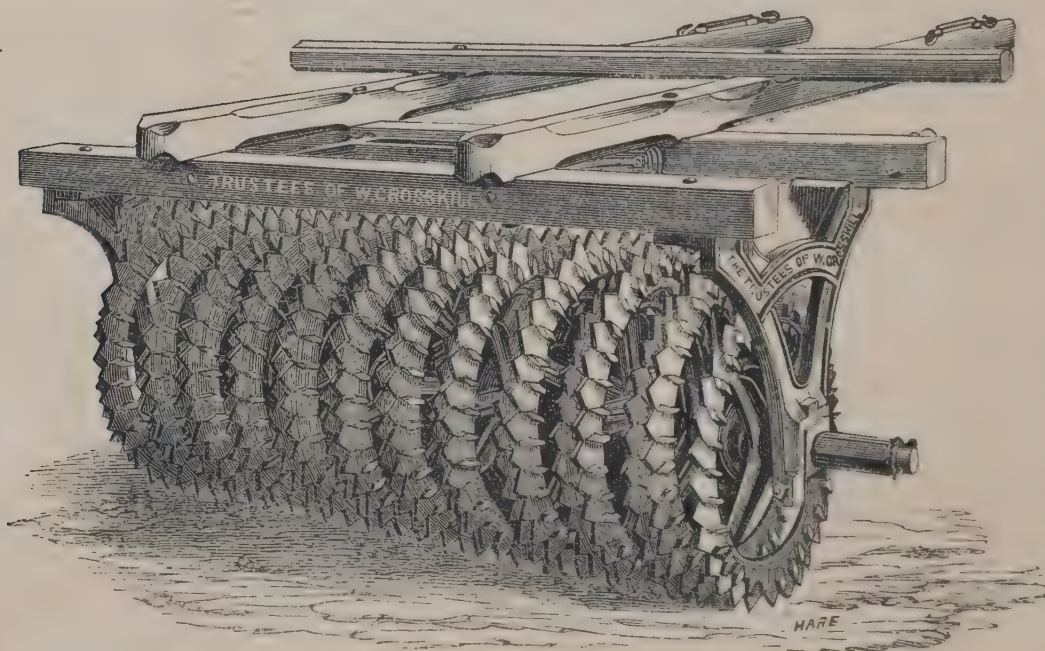
CROSSKILL, W. THE TRUSTEES OF, *Beverley Iron Works Beverley, Yorkshire.*—An assortment of prize agricultural implements.



THREE-HORSE REAPING MACHINE.

The Trustees of W. CROSSKILL'S NEW 3-HORSE REAPING MACHINE, with self-delivery. Awarded the first prize of £14 by the Royal Agricultural Society of England at Leeds, 1861. Price £37 0

The Trustees of W. CROSSKILL'S IMPROVED NORWEGIAN HARROW. Awarded the silver medal by the Royal Agricultural Society of England. Price . . £15 15

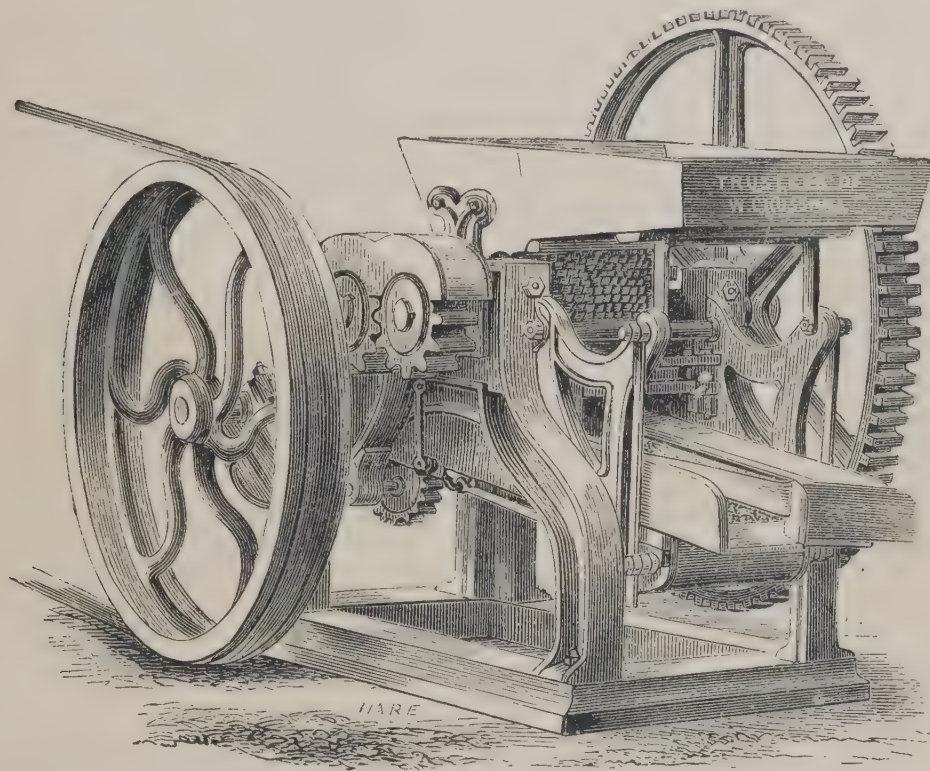


SELF-CLEANING CLOD CRUSHER AND ROLLER.

The Trustees of W. CROSSKILL'S IMPROVED PATENT SELF-CLEANING CLOD-CRUSHER AND ROLLER. Awarded the special gold medal, 37 sovereigns, and 2 silver medals

by the Royal Agricultural Society of England. Price, £16 10s. or with travelling wheels £18 10

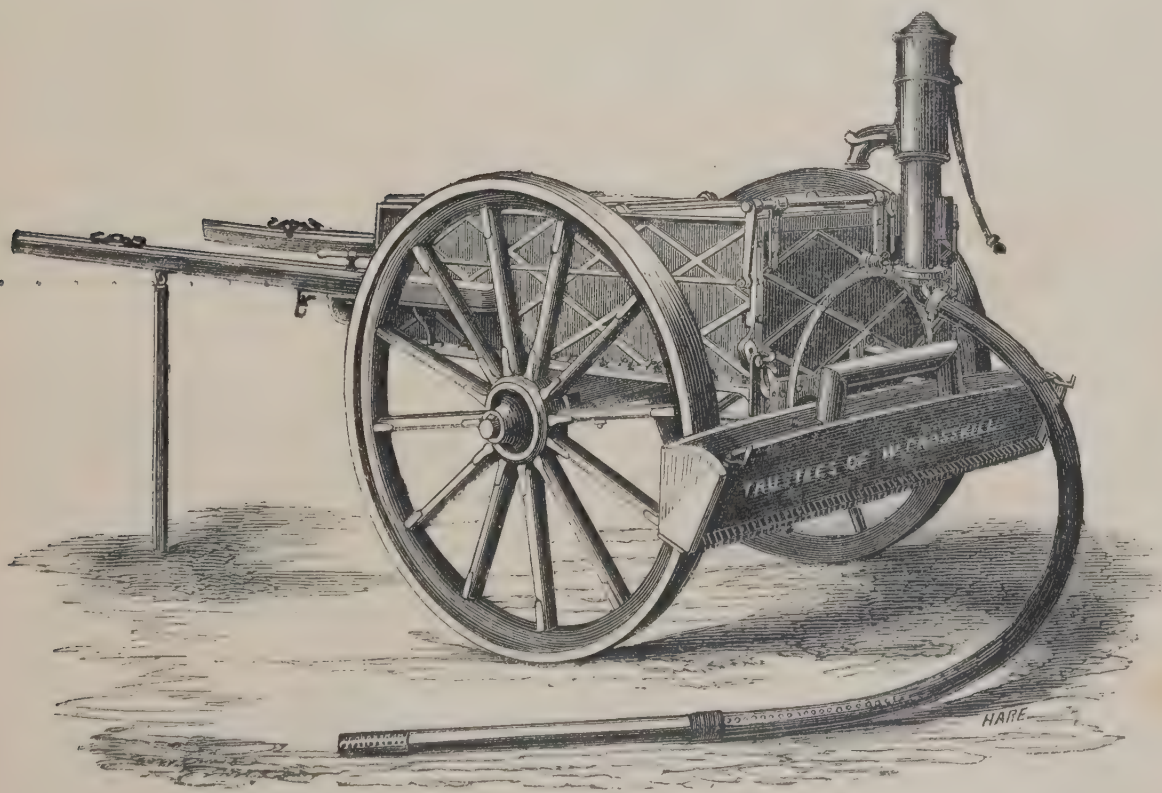
CROSSKILL, W. THE TRUSTEES OF, *continued.*



BONE MILL.

The Trustees of W. CROSSKILL'S IMPROVED BONE MILL.
Awarded the first prize of £5 by the Royal Agricultural
Society of England at Canterbury, 1860. Price £85 0

The Trustees of W. CROSSKILL'S IMPROVED BONE-DUST
MILL. Awarded the first prize of £5 at Chester, 1858,
and £10 at Canterbury, 1860, by the Royal Agricultural
Society of England. Price £80 0



LIQUID MANURE DISTRIBUTOR.

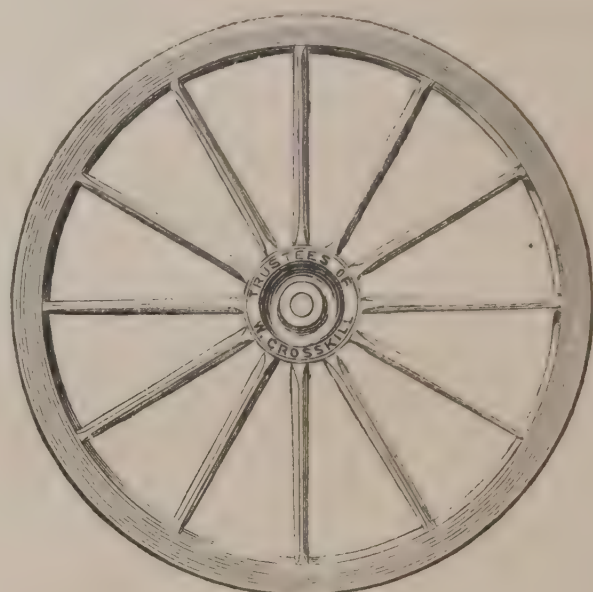
The Trustees of W. CROSSKILL'S IMPROVED LIQUID-
MANURE DISTRIBUTOR OR WATER CART. Awarded
the first prize of £6 by the Royal Agricultural Society

of England at Leeds, 1861. Price £17, or with portable
pump and pipe £22 15
Apparatus for watering 4 rows of turnips, 15s. extra ;
and portable tripod stand for pump, 15s. extra.

CROSSKILL, W. THE TRUSTEES OF, *continued.*

The Trustees of W. CROSSKILL'S PATENT WHEELS AND AXLES for carts, waggons, &c. Awarded 2 silver medals, for combining good workmanship with cheapness, by the Royal Agricultural Society of England.

These articles are manufactured by machinery, and celebrated for strength, durability, and easy running.



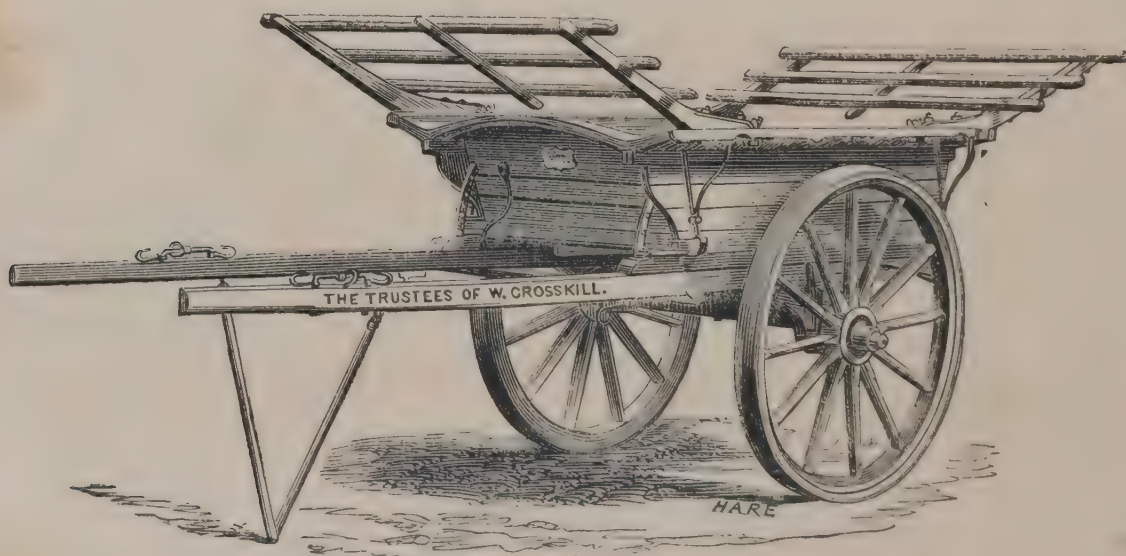
PATENT WHEEL.



LIGHT SPRING CART.

The Trustees of W. CROSSKILL'S LIGHT SPRING CART. Awarded the prize of £2 for the best cheap market cart

by the Royal Agricultural Society of England, at Leeds 1861. Price £12 1



ONE-HORSE CART.

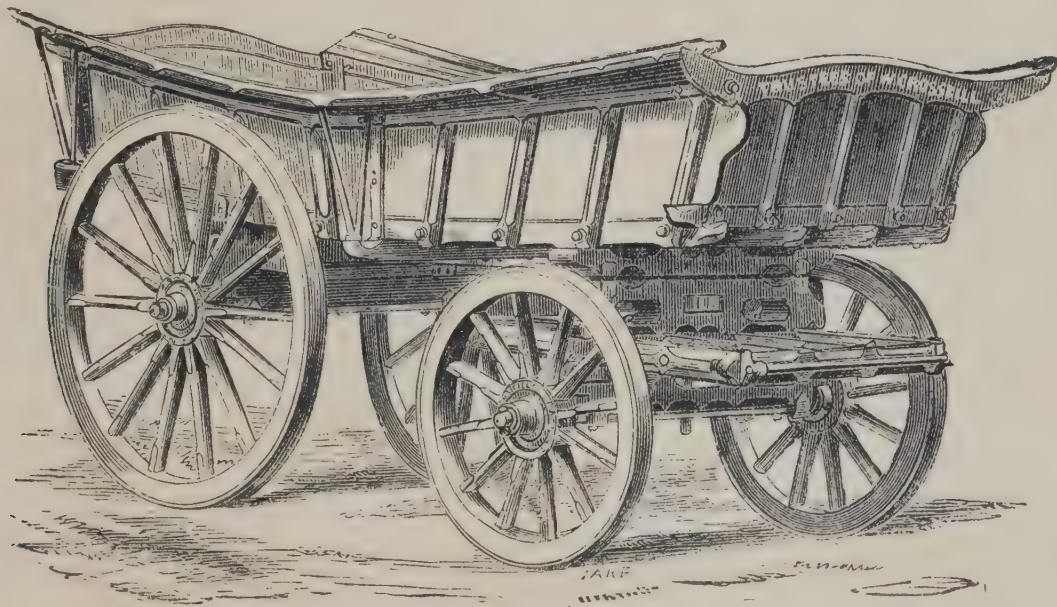
The Trustees of W. CROSSKILL'S IMPROVED ONE-HORSE CART. Awarded the first prize of £6 by the Royal

Agricultural Society of England, at Leeds, 1861. Price £13, or with harvest ladders £14 1

CROSSKILL, W. THE TRUSTEES OF, *continued.*

The Trustees of W. CROSSKILL'S MODEL 1-HORSE CART.
Awarded the first prize of £5 by the Royal Agricultural Society of England, at Newcastle-on-Tyne. Price

£14 5s. or with harvest shelvings. £15 15
The Trustees of W. CROSSKILL'S YORK PRIZE 1-HORSE
Cart. Price £11 10s. or with harvest raves . £13 10



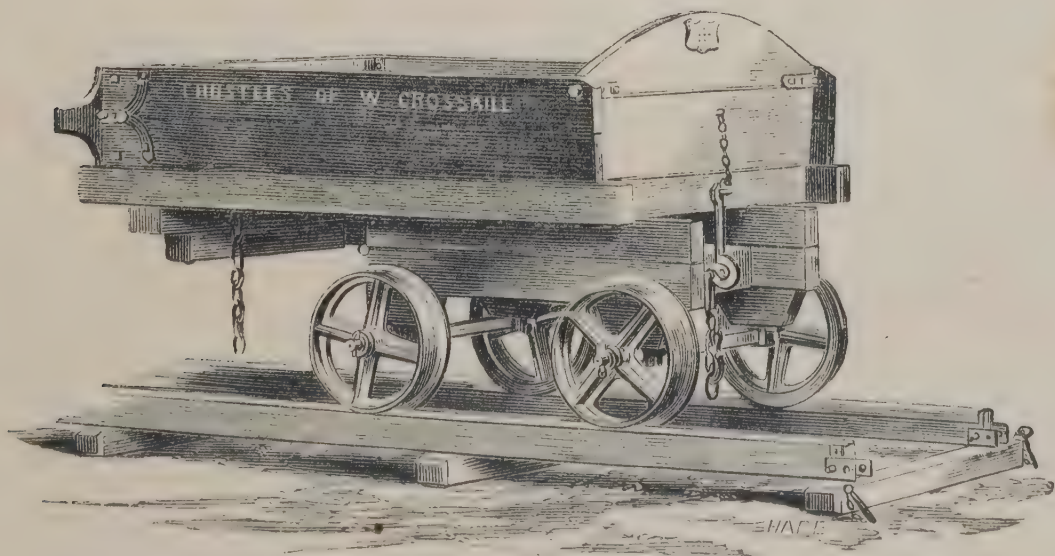
PAIR-HORSE WAGGON.

The Trustees of W. CROSSKILL'S PAIR-HORSE WAGGON.
Awarded 4 first prizes by the Royal Agricultural Society
of England. Price £29 10

WASHER. Awarded the silver medal by the Royal
Agricultural Society of England. Price . . £5 10

The Trustees of W. CROSSKILL'S ARCHIMEDEAN ROOT

The Trustees of W. CROSSKILL'S IMPROVED PATENT PIG
TROUGH. Price £3 5



PORTABLE FARM RAILWAY.

The Trustees of W. CROSSKILL'S PATENT PORTABLE FARM
RAILWAY. Awarded 2 silver medals by the Royal

Agricultural Society of England. Price 4s. per running
yard. Trucks to tip sideway or endway, £5 10s. each.

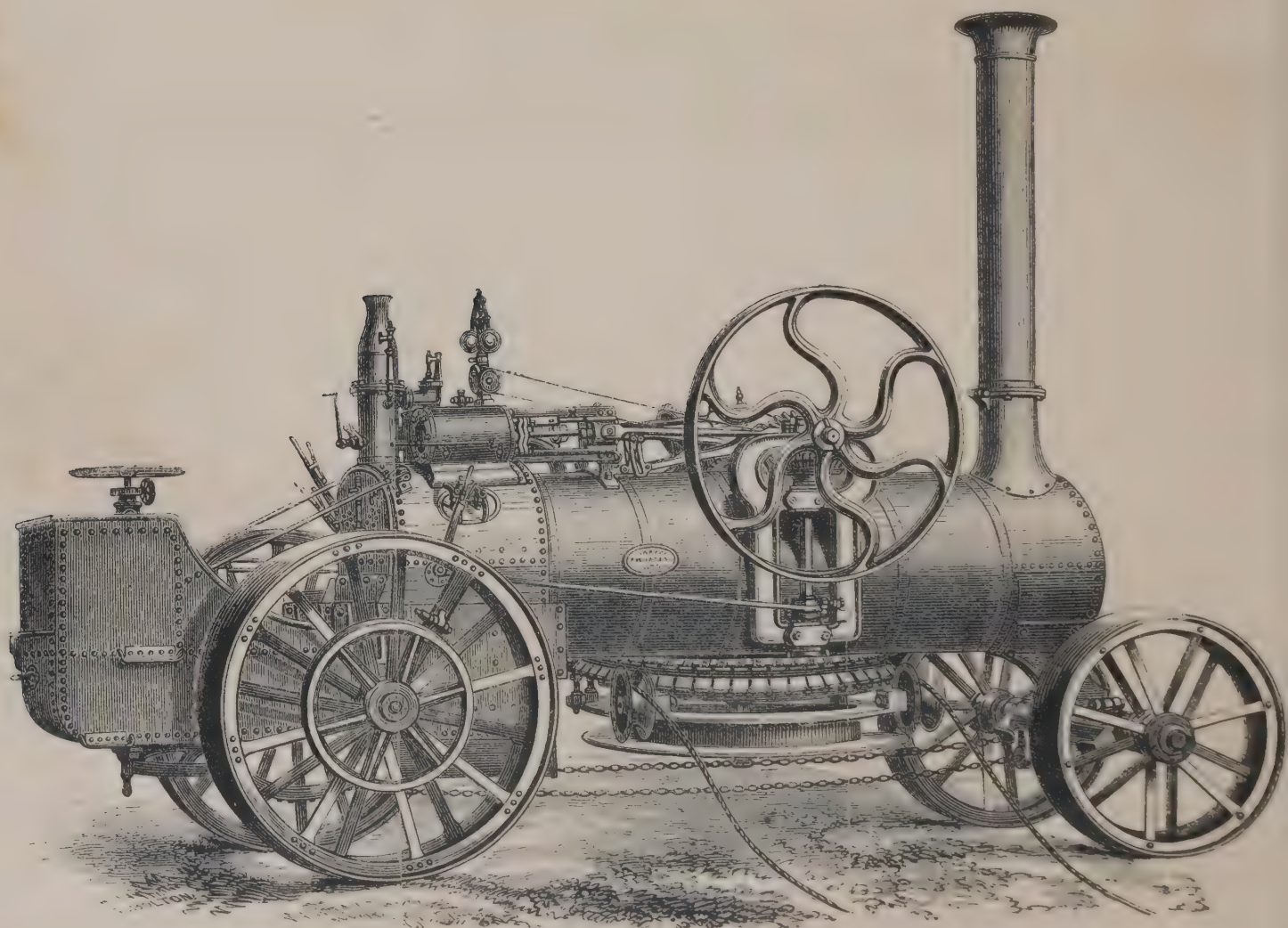
FOWLER, JOHN, JUN., 28 Cornhill, London, E.C.; and Steam Plough Works, Leeds, Yorkshire.—
Steam ploughs.



PLAN OF WORKING.

On the left headland is the engine and windlass, and directly opposite to them the anchor, which is self-moving, and between these the plough is pulled back-

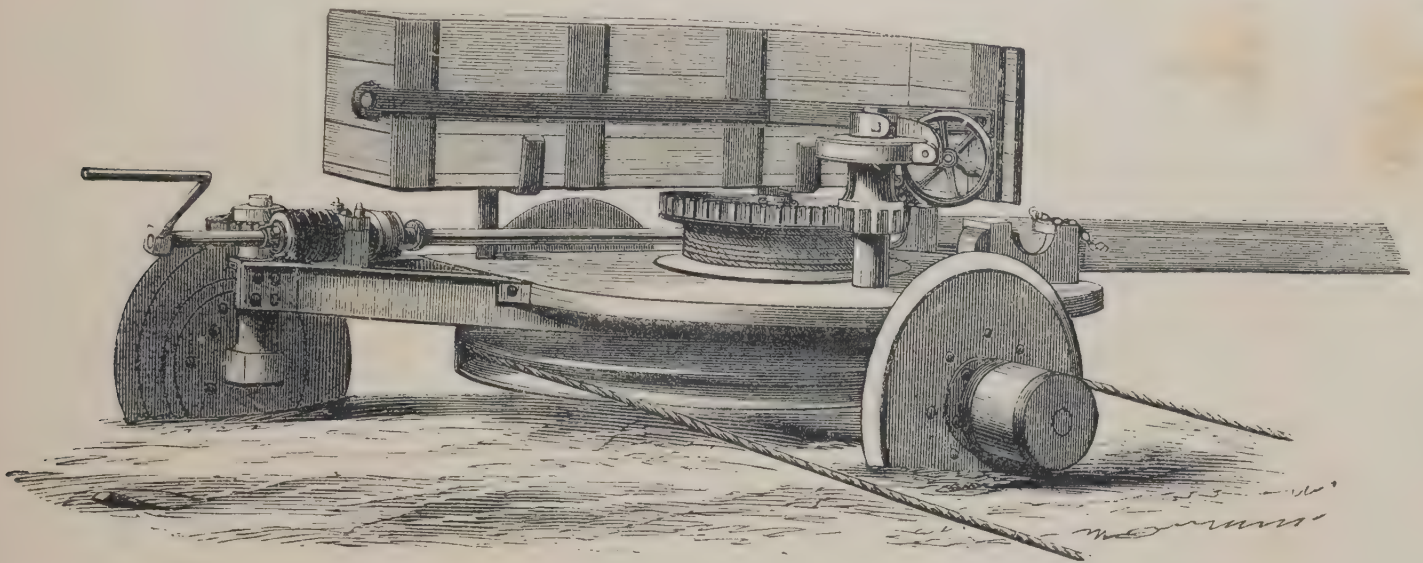
wards and forwards, one end of the plough being alternately in the air and the other in its work, thus avoiding the necessity of turning at the headlands.



LOCOMOTIVE ENGINE.

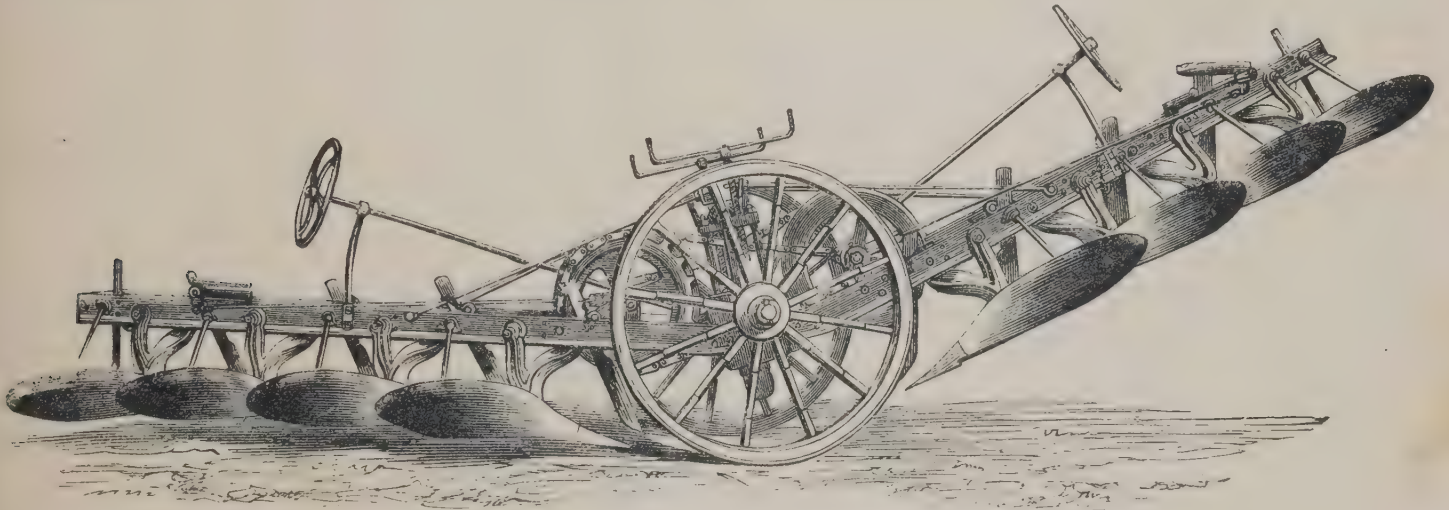
The above is an engraving of a LOCOMOTIVE ENGINE, adapted for steam ploughing. The clip drum for hauling the plough is placed under the boiler.

FOWLER, JOHN, JUN., *continued.*



PATENT ANCHOR.

This anchor is made to resist the side strain of the implement worked, by the cutting into the ground of the disc wheels, and it is moved along the headland at pleasure by the motion of the 5-ft. sheave, which is turned by the ploughing rope.



PATENT BALANCE PLOUGH.

The above engraving represents the PATENT BALANCE PLOUGH, made of iron, and adjustable to different widths of furrow.



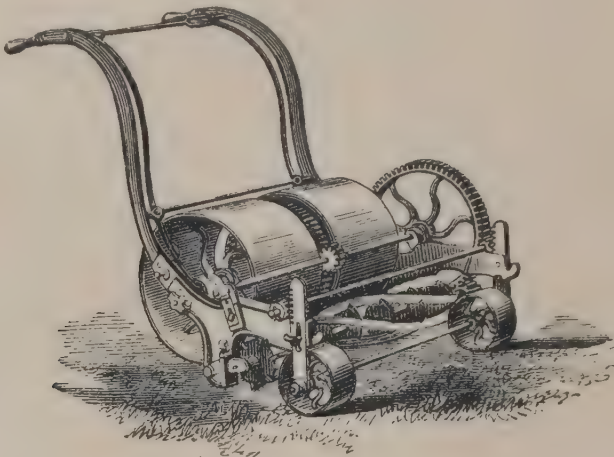
PATENT BALANCE CULTIVATOR.

This is an engraving of the PATENT BALANCE CULTIVATOR. It will take a breadth of 6 ft. at each bout.

This Apparatus has gained every Prize for which it has competed.

[2113]

FERRABEE, JAMES, & Co., *Stroud, Gloucestershire*; and 75 and 76A *High Holborn, London W.C.*—Machines for mowing lawns.



LAWN MOWER FOR TWO MEN.

FERRABEE'S PATENT LAWN MOWERS.

M 1. The "Handy Lawn Mower," which a lady may use with ease	£4 10	M 4. 19-in. for 2 men	7 0
M 2. 16-in. for 1 man	5 5	M 5. 22-in. ditto	7 10
M 3. 16-in. for man and boy	6 10	M 6. 26-in. pony machine	10 10
		M 7. 28-in. horse machine	16 0
		M 8. 36-in. ditto	20 0

[2114]

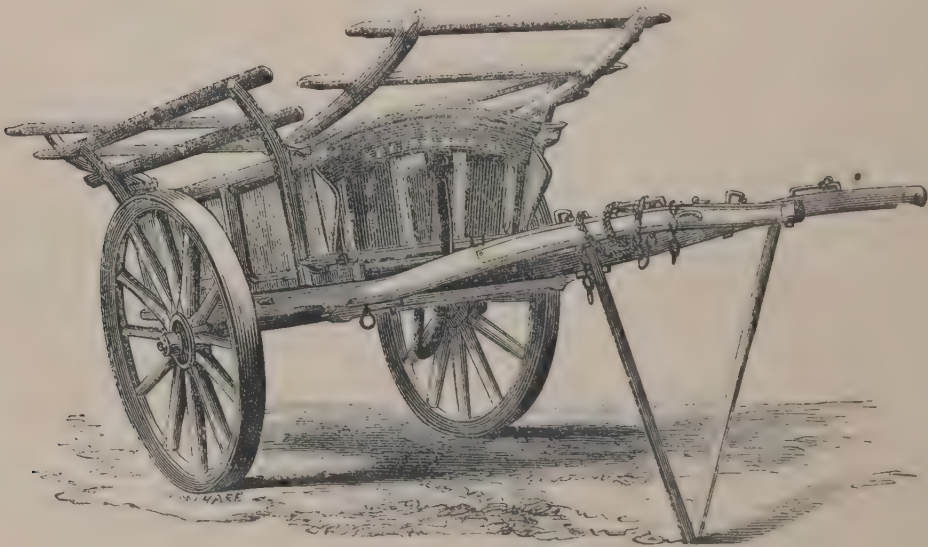
FERRYMAN, E. *Mendep Place, Oundle, Northamptonshire*—Patent self-kneading lever churn.

[2115]

FOWLER, JOHN, JUN., 28 *Cornhill, London, E.C.*—Steam ploughs. (*See pages 30, 31.*)

[2116]

FRY, A. & T., *Temple Gate, Bristol.*—Cart, and American horse rake.



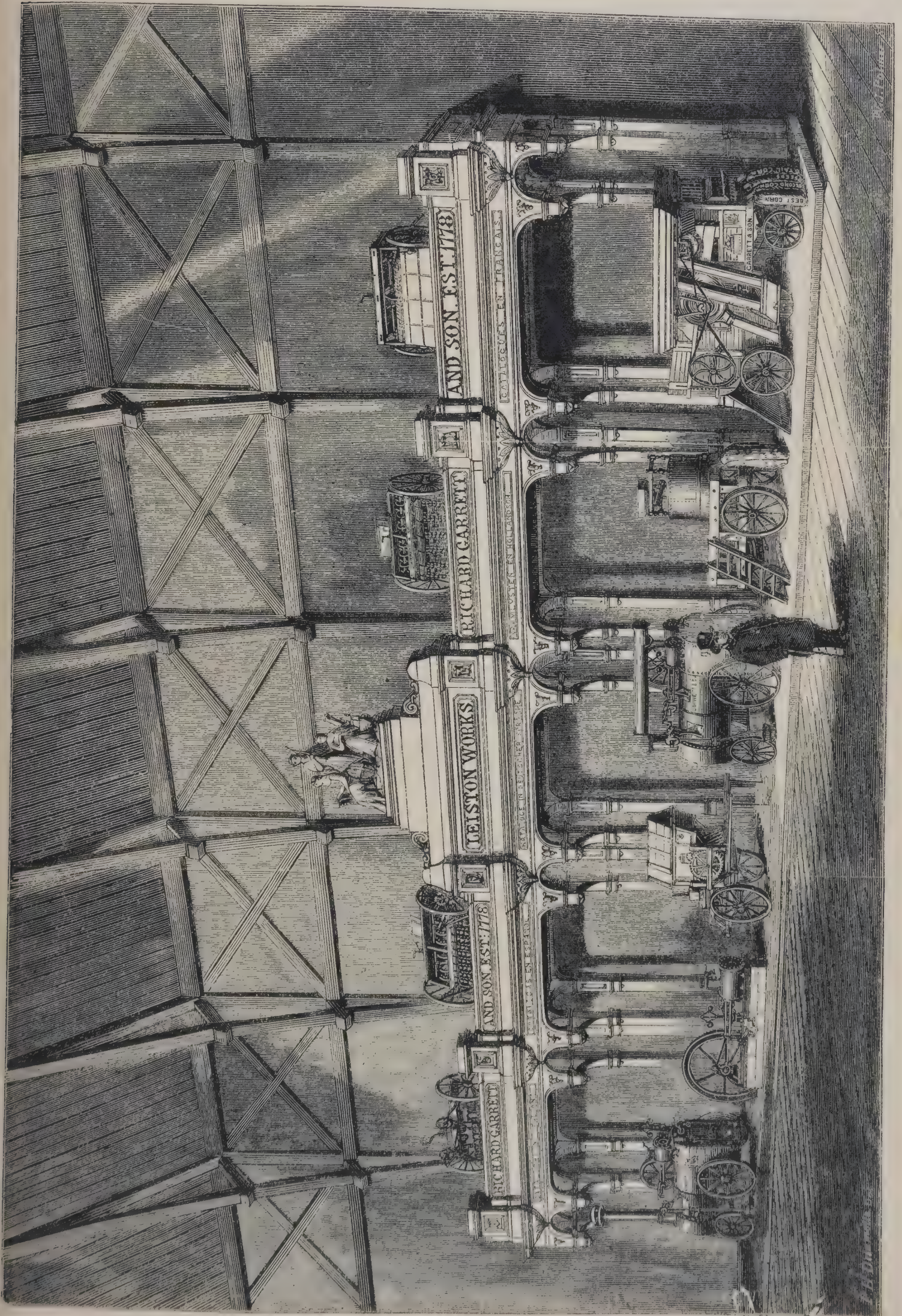
ONE-HORSE CART.

IMPROVED 1-HORSE CART for agricultural purposes, fitted with hay frame, tyres $3\frac{1}{2}$ in. wide.
Price, delivered in London £15¹⁵

PATENT TUBULAR IRON AMERICAN HORSE RAKE, capable of putting 3 acres of hay into winrows per hour. These rakes are only a few pounds heavier than the wooden ones, which are already so well known. Price according to size.

[2117]

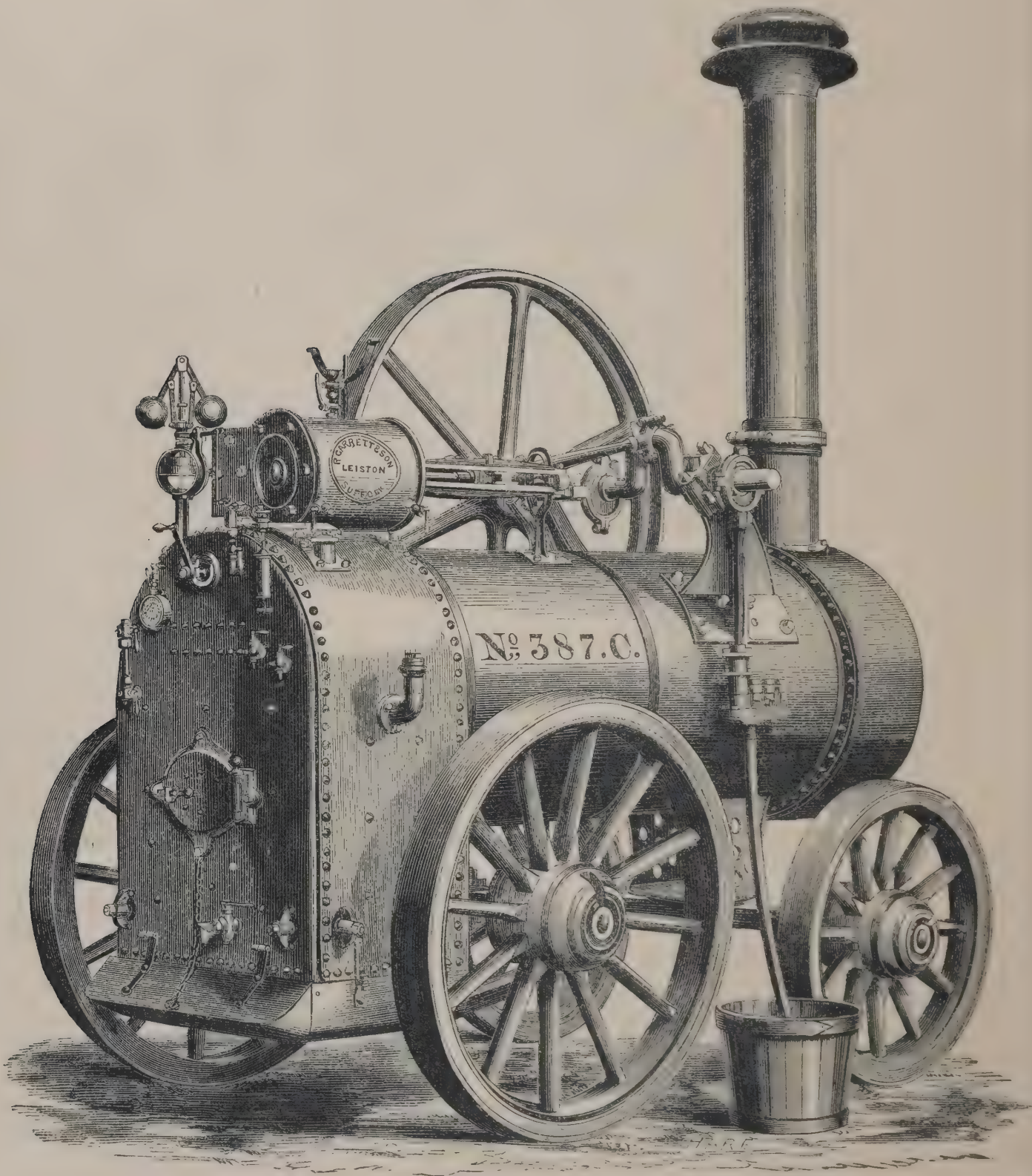
GARRETT, RICHARD, & SON, *Leiston Works, Suffolk, England.*—A selection of the most approved agricultural machinery.



GARRETT, RICHARD, & SON, *continued.*

Obtained the Council Medal in 1851 ; Gold Medal of Honor, Paris, 1855 ; and First-Class Gold Medal, Vienna, 1856 ; also 50 gold and silver medals from the different agricultural societies of Europe. R. G. & Son have in addition to these received an unprecedented number of money prizes, amounting to £1,200, and commendations almost without limit.

ESTABLISHED A.D. 1778.



GARRETT AND SON'S IMPROVED PORTABLE STEAM ENGINE.

The firm of RICHARD GARRETT & SON solicit the attention of noblemen, land owners, and farmers of all nations (who are desirous to improve agriculture), to their engines, machines, and implements, which are constructed upon the most scientific principles, of first-class workmanship, aided by the most modern mechanical appliances to facilitate the manufacture in both wood

and metals, all which materials are selected with a view to the utmost durability, which can best be appreciated by those who have recently inspected their works.

R. G. & Son respectfully invite all who may desire to form their judgment upon a sound basis, to avail themselves of the convenience which the Eastern Counties Railway now affords, for an inspection, which cannot

GARRETT, RICHARD, & SON, *continued.*

fail to induce them to patronise implements and machines of such superior manufacture and perfect finish.

All machinery and implements of R. G. & Son's manufacture may be seen in practical use on the farm annexed to the works, and adjoining the Leiston Railway Station.

The widely spread, and rapidly increasing demand throughout Europe for steam thrashing machines (in which this firm has retained the precedence for improvements during the last half century) has urged upon them the necessity for producing a machine, more simple and effective in performing all the operations necessary to separate the corn from the straw, and make it a clean and perfect sample for sale. This is now done in one process, without any waste, and with very little manual labour, by the combined thrashing and dressing machine, described in the following pages.

Richard Garrett & Son also exhibit their well-known standard implements and machines, viz. portable and fixed steam engines, horse-power thrashing machines, dressing machines, grinding mills, drills, and horse-hoes; adapted for all methods of cultivation, which will be briefly described in the following pages. Detailed catalogues and particulars of shipment, with estimates of cost of delivery to any part of the world, may be obtained on application to Leiston Works, or at their stand, in Class 9, at the International Exhibition.

In consequence of the extensive connexions of this firm, shipments are made in full cargoes, by vessels freighted direct from the works to many of the principal European ports, and this arrangement saves their customers the heavy charges usually incurred for packing and incidental shipping expenses, and insures the machinery being delivered in a sound and perfect condition. When required a competent man can be sent at a moderate expense, to instruct others in the use and management of the machines in work.

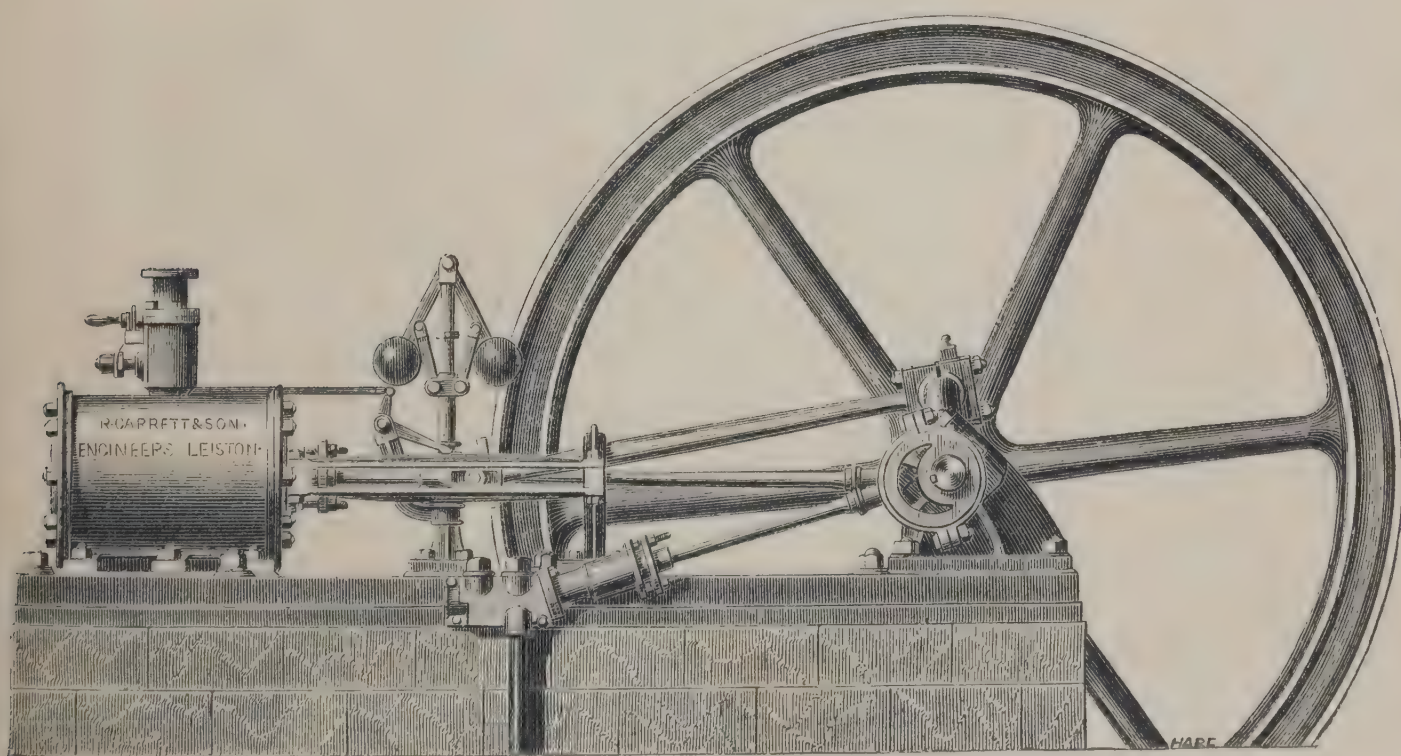
GARRETT & SON'S IMPROVED PORTABLE STEAM

ENGINE. Price, with travelling wheels, complete, varying according to power, from £170 to £420 0

A marked improvement will be found not only in the appearance, but also in the practical working qualities of R. G. & Son's improved portable steam engines since the exhibition of 1851, at which, in common with one other exhibitor only, they received the council medal for the portable steam engine then exhibited. So great has been the demand for their improved portable steam engines in connexion with the patent thrashing machines, and also for contractors' purposes, that an entire new set of workshops, covering about two acres of ground, have been added to the Leiston Works since the year 1851. These shops are fitted with the latest and most approved mechanical tools and appliances for producing this class of machinery of the very best description, mechanically constructed and arranged, with every part perfectly true, and thoroughly well finished, and also at a first cost so moderate as to enable R. G. & Son to defy competition. With these facilities at their command, Garrett & Son are in a position to execute orders to any extent promptly.

These engines are adapted for working a thrashing and dressing machine of large dimensions, a circular or vertical sawing machine, a stone grinding mill, a set of steam cultivating apparatus, &c. &c. The two main points R. G. & Son have taken especial pains to carry out in the improvements introduced into their portable engines, are—

Economy in the consumption of fuel; and the arrangement of the working parts with a view to durability and facility for renewing the wearing parts when necessary. And in these very important points, R. G. & Son have been eminently successful, and can with confidence refer to any of their portable engines now in use in almost every county of England, and in many parts of Ireland, Scotland, Europe, and the Colonies.



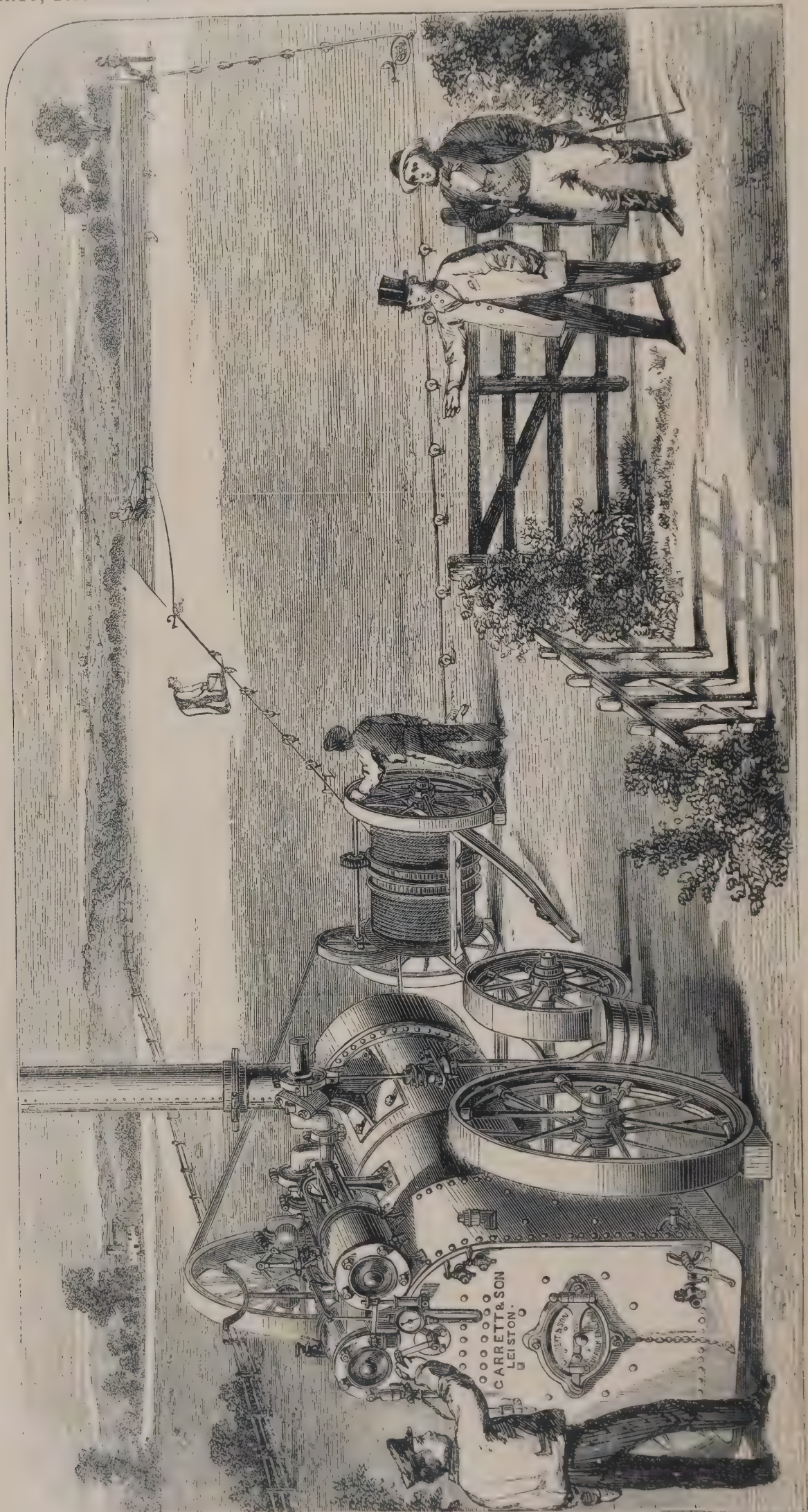
GARRETT AND SON'S IMPROVED FIXED STEAM ENGINE, WITH HORIZONTAL CYLINDER.

GARRETT & SON'S IMPROVED FIXED STEAM ENGINE, with horizontal cylinder. Price, complete, 4 to 20 horse power, £120 to £440 0

This form of engine is now generally preferred to those with vertical cylinders, being more compact in form, occupying less space, is fixed with greater facility and at less cost, and more easy of removal.

It is fixed on a metal foundation plate, and the various working parts being easily accessible, the adjustment and repairs are done with facility, the boiler is on the Cornish principle of an improved construction, and will be found very economical in generating steam, exceedingly strong and durable. Every part required for working these engines, including all the requisite fittings, to the end of the fly-wheel shaft, are sent with each engine.

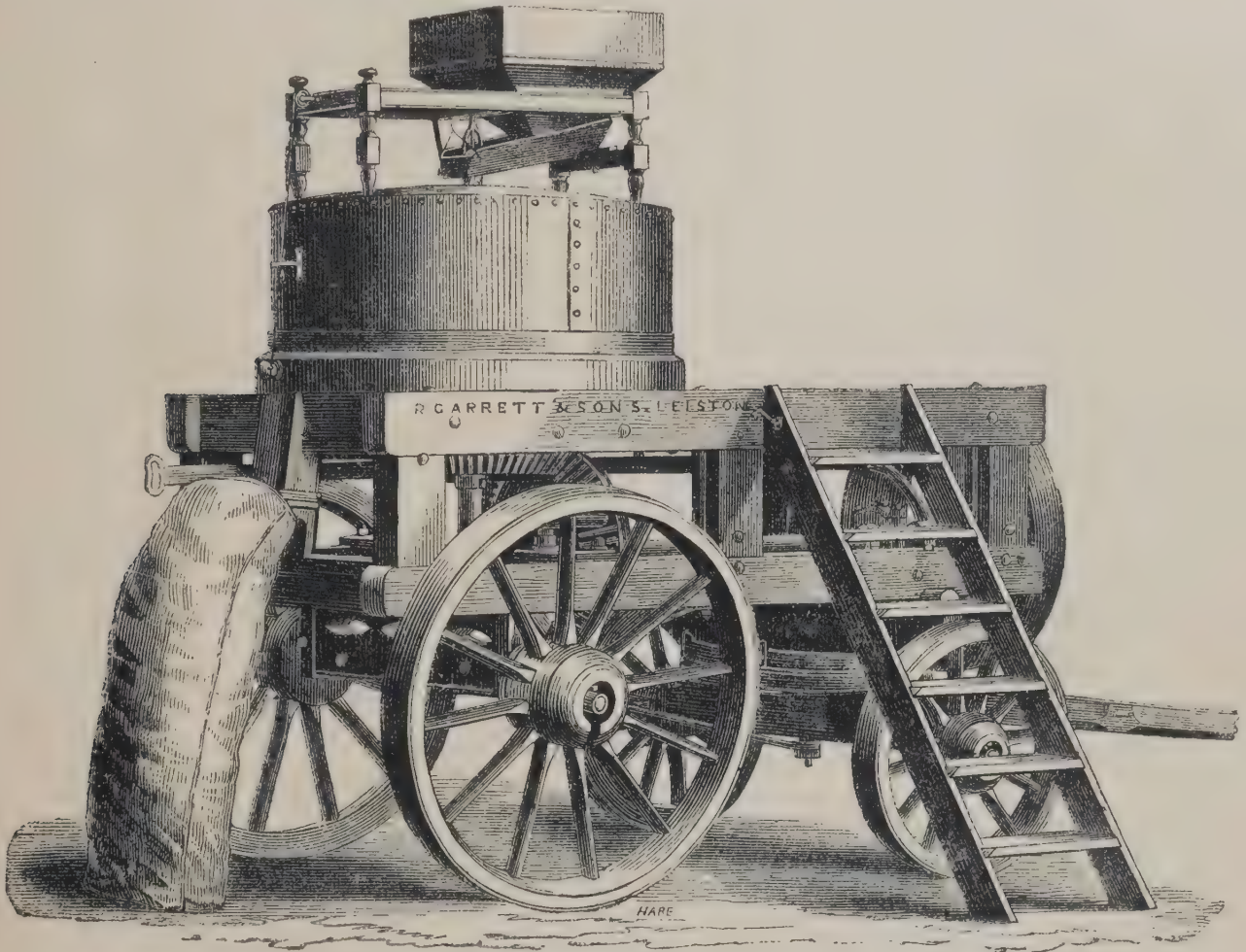
GARRETT, RICHARD, & SON, *continued.*



GARRETT AND SON'S DOUBLE-CYLINDER STEAM PLOUGHING ENGINE AND TACKLE.

RICHARD GARRETT & SON have recently arranged for the manufacture of steam cultivating apparatus, with the latest improvements, under Messrs. Howard's various patents. Full detailed particulars will be given on application.

GARRETT, RICHARD, & SON, *continued.*



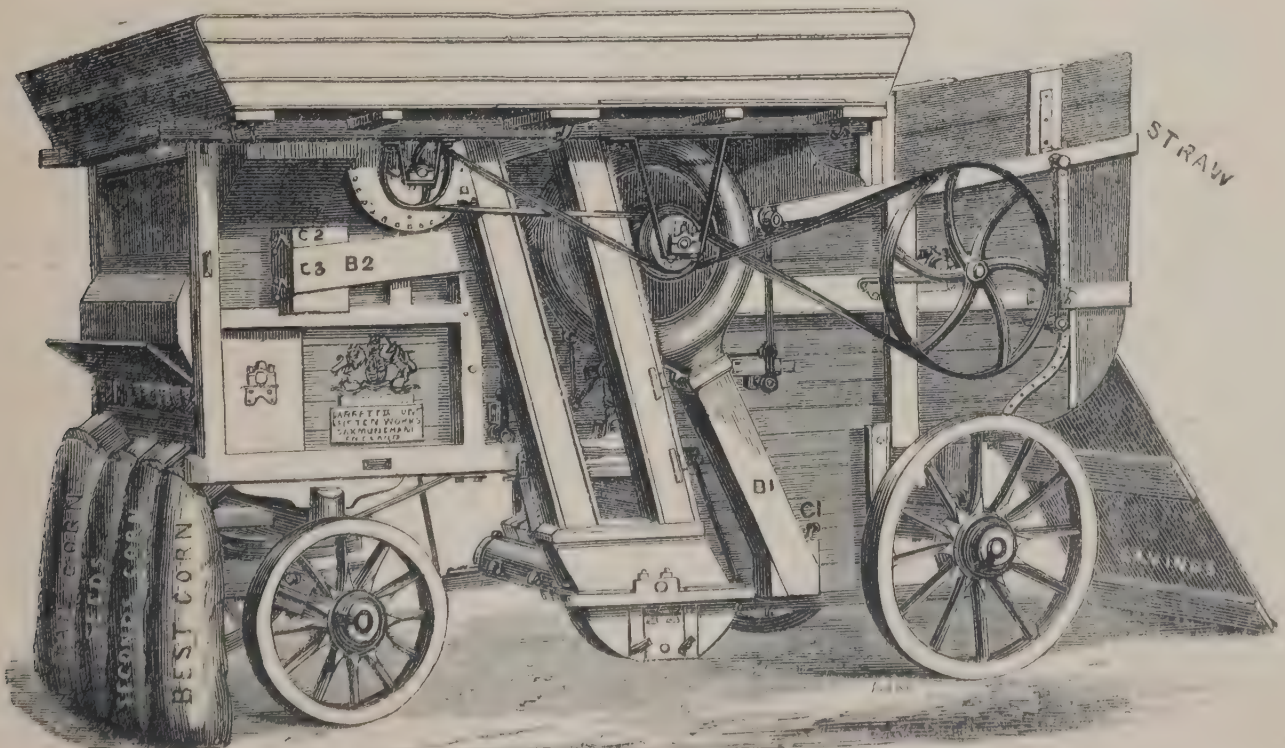
GARRETT AND SON'S IMPROVED STONE MILL FOR GRINDING WHEAT.

GARRETT & SON'S IMPROVED STONE MILL for grinding wheat for flour, and other corn for feeding purposes. Price, with pair of French burr or peak stones, £44 to £90 10

This mill is adapted for grinding every description of farm produce expeditiously and economically, and is fitted with an improved apparatus for adjusting the stones so as to grind to any degree of fineness required. An improved wrought-iron crane is sent with it which is used for the purpose of raising the upper stone when required to do so for dressing.

GARRETT & SON'S PATENT COMBINED THRASHING AND DRESSING MACHINE, for steam or water power, on the new principle introduced by R. G. & Son, in 1859, and secured by letters patent. Price, according to power, complete for travelling, from £85 to £130 0

The cut given below shows one of R. G. & Son's new patent machines described in their Illustrated Catalogue as "A2," and explains the new and improved construction introduced into this class of machines, as compared with those on the old principle. The main difference between



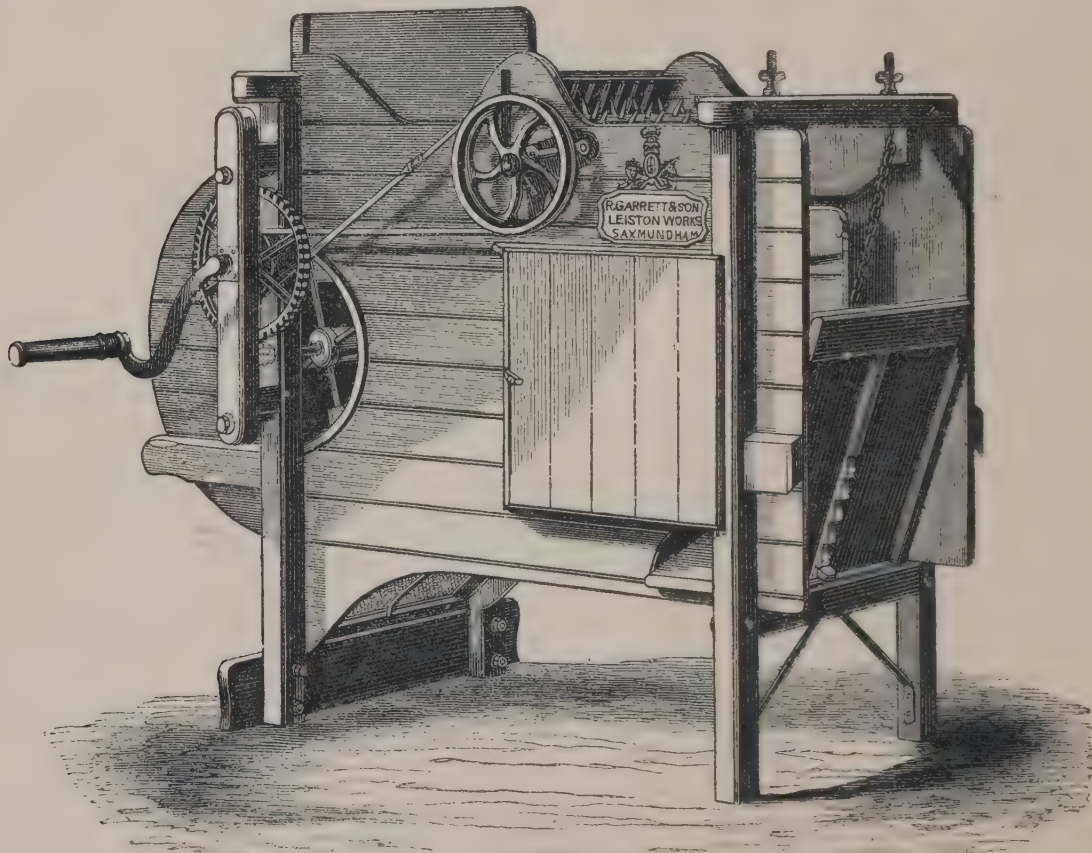
GARRETT AND SON'S PATENT COMBINED THRASHING AND DRESSING MACHINE.

GARRETT, RICHARD, & SON, *continued.*

the two is, that in the patent machines, all the blast necessary for dressing the grain is produced at one place by a fan (marked A in the cut), and conducted through the trunks B1 and B2, where it comes into contact with the grain, and by means of the valves C1, C2, and C3 can be regulated instantaneously, so as to suit every kind and description of grain. Instead of this compact and convenient arrangement, in machines made on the old system, the different separations are made by complicated machinery, placed in various parts of the machine, requiring great power to work it, and involving a considerable amount of friction, and consequently increased wear and tear. This machine is fitted with an improved revolving screen, by which four perfect separations are made, and the grain delivered into four sacks, viz. best corn, seconds ditto, tail corn, and seeds; the chaff (a very great improvement) being delivered quite free from seeds. This machine will deliver the corn rough-dressed instead of finishing it for market when required, and is adapted to the power of an 8-horse engine.

GARRETT & SON'S PATENT COMBINED THRASHING AND DRESSING MACHINE, for rough-dressing grain, *i. e.*, leaving the sample so that by once

passing through a finishing-dressing machine, it is fit for market. Price according to power, complete for travelling, from £80 to . . . £120
No cut is given of this machine, as it is constructed precisely the same principle as the foregoing machine and only differs from it in having two instead of three blasts. The same description that applies to the foregoing machine (excepting merely so far as it refers to third blast) applies equally to this. It may be thought superfluous to bring out a machine that professes only rough-dress the corn, seeing that the finishing machines are adapted for being used as rough-dressers, doing equally good work in either case; but as there are a large number of agriculturists who will not have the finishing machine under any circumstances, R. G. & Son found it desirable to bring out a machine on their new patent principle, rough-dressing only, and without the necessary additional machinery required for finishing the sample.
These machines are adapted for the power of a 5 or 8-horse engine, and are described in R. G. & Son's Illustrated Catalogue (in English) as the B machine.
It is essentially important to bear in mind, that this machine will under ordinary circumstances be found to finish the sample for market.



GARRETT AND SON'S IMPROVED CORN-DRESSING MACHINE.

GARRETT & SON'S IMPROVED CORN-DRESSING MACHINE. Price, complete. £9 0

This machine is more particularly adapted for the purpose of dressing corn when the chaff, broken straw, ears, leaf, and rubbish are all mixed, and for separating the inferior corn from the best. It will dress all kinds of grain or small seeds, and is fitted with a spiked roller for chaffing the corn when in a very rough state.

GARRETT & SON'S IMPROVED CORN-DRESSING MACHINE, OF SMALL SIZE. Price £6 10

This machine is for the purpose of dressing all kinds of corn or small seeds in a perfect manner after being roughly sifted. It requires but a small amount of power to work it, say one man and a boy, and it will perform a large quantity of work in proportion to the power, cleaning all kinds of corn and small seeds perfectly.

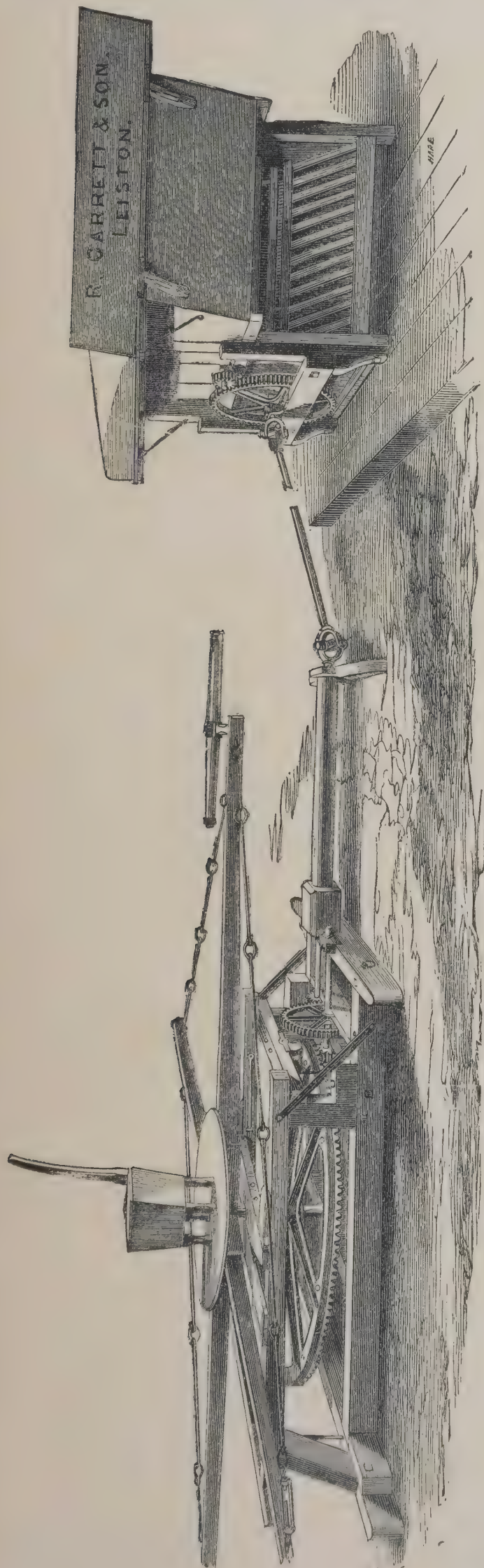
GARRETT & SON'S HORSE-POWER BOLTING THRASHING MACHINE. Price, complete, with travelling wheels,

3-horse power £50
4-horse power 57

R. G. & Son's Thrashing Machine was the only one included in the award of a Council Medal, in 1851.

These machines were introduced by R. G. & Son about 25 years ago, in order to supply a demand then and is considered to be of the greatest importance, viz. delivery of the straw quite uninjured, and fit either use on the farm, for thatching purposes, or for sale; the peculiar form of drum fitted to these machines answers for this purpose most satisfactorily, as the straw is delivered by it quite straight and unbroken. For thrashing barley by horse-power, this form of machine stands unrivalled, as it in no way injures the germ of the seed. Agriculturists residing in the vicinity of large towns where the straw can be profitably sold, have found this machine a valuable acquisition. The "bolting" drum has also been applied to the combined machines for steam power, and is used extensively in every part of England.

GARRETT, RICHARD, & SON, *continued.*



GARRETT AND SON'S IMPROVED HORSE-POWER OPEN-DRUM THRASHING MACHINE.

The above engraving represents the machine set down for work, with the jointed spindle and bridge to connect them.

GARRETT & SON'S IMPROVED HORSE-POWER OPEN-DRUM THRASHING MACHINE, adapted expressly for being worked by small colonial or foreign horses. Price, complete, with travelling wheels,

2-horse power	• • • • •	£36	0
4-horse power	• • • • •	48	0

R. G. & Son were the only exhibitors who received the Council Medal for thrashing machines in 1851.

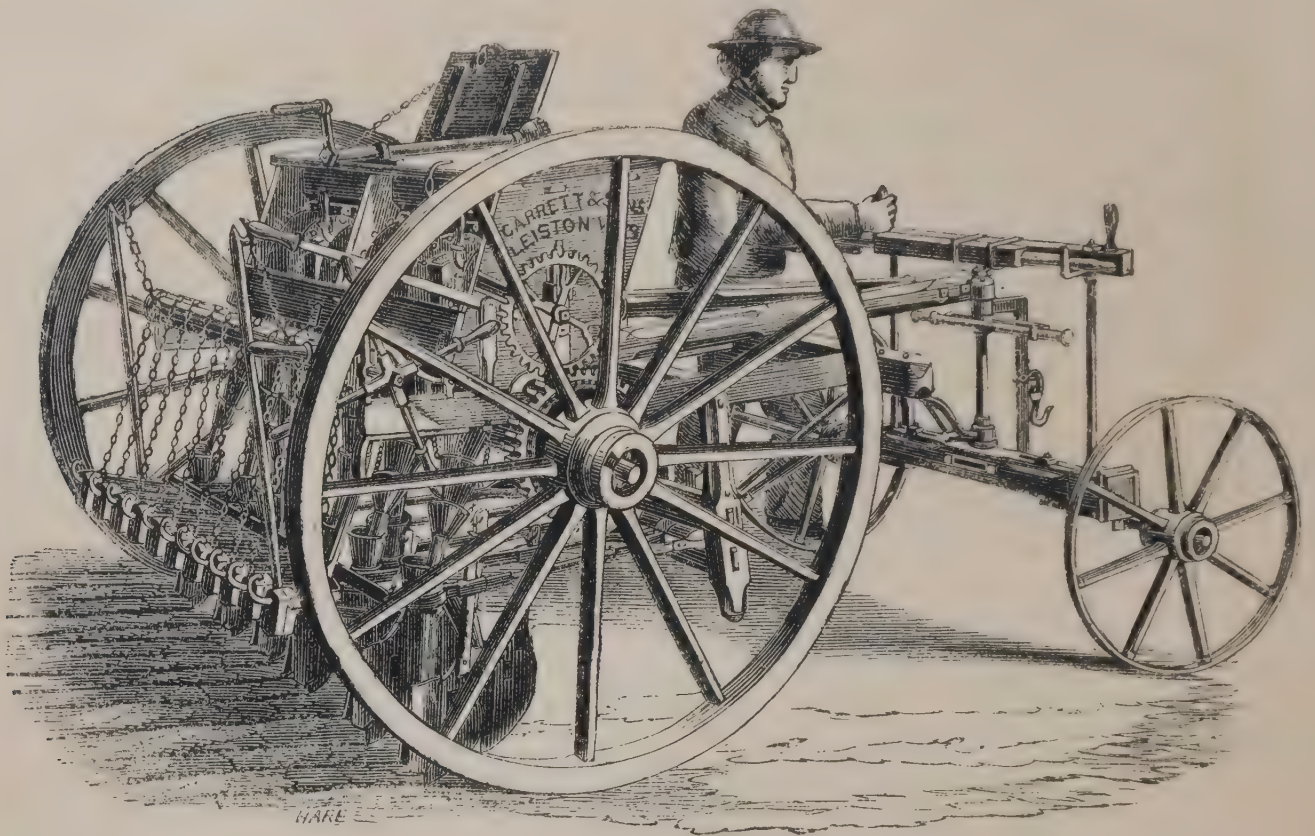
They have also received for their horse-power thrashing machines, awards at the

Great International Exhibitions of England, France, and Germany, and numerous other prizes (in all some 50 medals and £1,200 in specie).

This machine has been brought out expressly for the purpose of suiting the special requirements of the colonial and foreign farmers; the travelling wheels are made extra broad and strong, fitted with iron axles, with hollowed boxes to carry the grease, especially adapted for travelling over rough roads or uncultivated ground, and properly proportioned to the power of the horses for effectually working the same. The woodwork is extra seasoned by being specially dried, and will not be the least injured in the hottest climates, and the machine is constructed throughout with the view of economising cost of freight by packing in the smallest possible compass.

The working parts are precisely similar in construction to the ordinary open-drum thrashing machines of R. G. & Son's manufacture, of which 3,500 have been sold during the last 30 years.

GARRETT, RICHARD, & SON, *continued.*



GARRETT AND SON'S IMPROVED ELEVEN-ROW SUFFOLK LEVER CORN AND SEED DRILL.

GARRETT & SON'S IMPROVED ELEVEN-ROW SUFFOLK LEVER CORN AND SEED DRILL. Price of the drill for 9 rows spreading 5 feet, to 13 rows spreading 7 feet, £21 10s. to £26 15

This drill is extensively used at home and abroad for the purpose of drilling in rows at any distance apart, wheat, barley, beans, peas, and other grain, and by changing the delivery barrel, turnips, mangold wurtzel, and other seeds.

An improvement has been made in the fore-steerage, rendering it easier of management, and preventing its proper working being affected by clods and other inequalities of the surface. It is adapted for every description of soil, for flat or hilly lands, and will be found to perform in the most efficient and economical manner every operation for which a drill can be employed.

** For price of the different wearing parts, extras, &c. see R. G. & Son's Illustrated Catalogue (in English), page 5.

GARRETT & SON'S IMPROVED SMALL OCCUPATION LEVER CORN AND SEED DRILL. Price of the drill for 7 rows spreading 4 feet, to 10 rows spreading 5½ feet, £16 to £20 0

This drill is similar to the preceding one so far as it is adapted for drilling all kinds of corn and seed, but as it is constructed on a smaller scale, and the frame, and also the various wearing parts, are made lighter, it is not adapted for drilling such large quantities as the full size Suffolk corn drill, being more suitable for small light land farms.

** For price of the different wearing parts, extras, &c. see R. G. & Son's Illustrated Catalogue (in English), page 6.

GARRETT & SON'S IMPROVED GENERAL PURPOSE LEVER DRILL, with 11 coulter, for drilling all kinds of corn and seed, either with or without manure. Price of the drill, with 9 rows spreading 5 feet, to 13 rows spreading 7 feet, £38 to £46

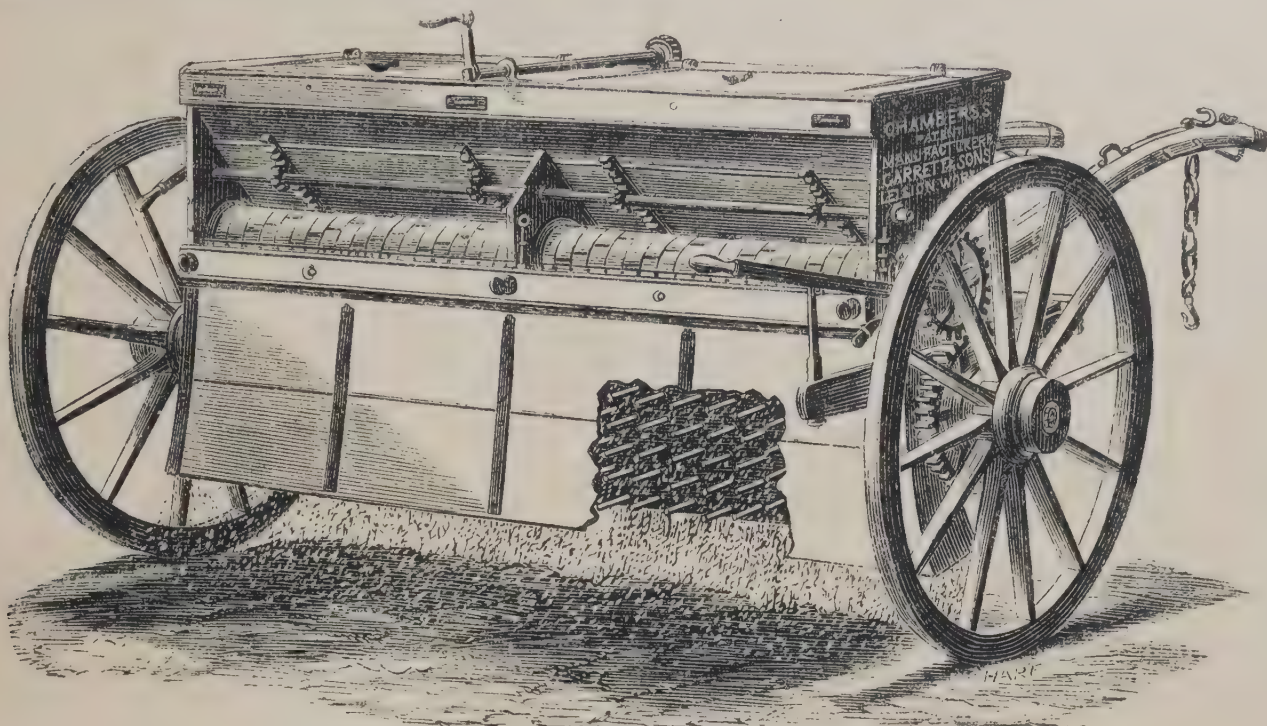
This drill is adapted for performing the various operations of seeding and manuring the soil. It will deposit all kinds of grain or seed, either with or without compost or artificial manures, at any required distance apart, and at any depths. It will drill with perfect regularity in going up or down hill, also on side hills as well as on flat land, and it is equally well adapted for lands ploughed flat or in ridges. The jointed iron lever introduced by R. G. & Son some years since, is a valuable adjunct to the drill, and has been generally adopted. The Chambers' patent barrel is calculated for drilling artificial manures in any required quantities, say from 2 to 60 bushels per acre; and the drill, when required, can be used for distributing manure broadcast, over grass or corn lands.

GARRETT & SON'S IMPROVED THREE-ROW ECONOMICAL SEED AND MANURE DRILL, for turnips and other seeds with manures on flat or ridge lands. Price of the drill complete, for 3 rows £16 1

This is a very cheap, serviceable, and efficient drill, for the purpose of drilling in rows on either flat or ridge ploughed lands, all kinds of seeds with artificial or light pulverized manures.

It is adapted to the draught of a pony or small horse, and will be found most convenient for use and easy management.

GARRETT, RICHARD, & SON, *continued.*



CHAMBERS' PATENT BROADCAST MANURE DISTRIBUTOR.

CHAMBERS' PATENT BROADCAST MANURE DISTRIBUTOR. Price complete, spreading $7\frac{1}{2}$ feet, £16 10s. to £19 0

Included in the award of the gold médaille d'honneur, Paris, 1855, and the first gold medal, at Vienna, 1857.

This machine is in extensive use both at home and abroad, for the purpose of distributing either broadcast or in rows, all kinds of artificial manures, such as guano, blood manures, salt, nitrate of soda, &c. which it delivers in the most even manner, in quantities varying as required from 2 to 100 bushels per English statute acre.

GARRETT'S PATENT HORSE-HOE. Price of the horse-hoe, complete, £16 to £22 0

This well-known implement has met with an unparalleled success, both in competing for prizes, and in being brought into practical use, as it has won every prize for which it has contended, and after twenty years' practical test in all parts of the world, is universally admitted to

be as thoroughly efficient and useful an implement as there is in use.

This implement will hoe in an effectual manner every variety of drilled root or grain crop, at the rate of 10 to 15 English statute acres per day, and at a cost of not exceeding 6d. per acre. It will work effectually on uneven ground; the hoes are kept a uniform depth in the ground, and the weeds are effectually destroyed, however uneven the surface of the ground may be. The steerage is a valuable addition to the hoe, as it enables the attendant to steer the hoes to the greatest nicety, and does away with any risk of cutting up the plants. The new patented arrangement for regulating the position of the hoe blade will be found superior to any other, and very effectual. A grass seed engine is attached to this hoe for the purpose of sowing grass seeds broadcast, while hoeing spring corn, delivering the same in any required quantities by means of revolving brushes.



GARRETT'S PATENT HORSE-HOE.

* * For Description in FRENCH, GERMAN, DUTCH, ITALIAN, and SPANISH, see Appendix, pages 113 to 116.

[2118]

GIBBONS, PHILIP & HENRY PHILIP, *Wantage, Berkshire*.—A portable combined double-blower thrashing machine.

[2119]

GRAY, JAMES, *Danvers Street, Chelsea*.—Elegant span-roof conservatory; tubular boiler, patent valve.

JAMES GRAY carries on the business of a horticultural builder in all its branches. The building department is managed by first-rate practical men, and the heating is under his own special care. He has been honoured during the past year with the erection and heating of the immense ranges of glass structures in the gardens of

His Grace the Duke of Hamilton, at Hamilton Palace, Scotland; and also those in the gardens of the Right Hon. the Earl of Craven, at Combe Abbey, Warwickshire, where his works may be seen, as also in many others of the principal gardens in the country.

[2120]

GRAY & SONS, *Belfast*.—Agricultural machinery.

[2121]

GRAY, JOHN & Co. *Uddingston, near Glasgow*.—Agricultural implements, machines, and engine. (*See page 43.*)

[2122]

GREEN, THOMAS, *Smithfield Iron Works, Leeds, and Victoria Street, Holborn, London*.—Green's patent lawn-mowing machines. (*See page 44.*)

[2123]

HALKETT, PETER, *142 High Holborn*.—Guideways; entire steam agriculture; connexion shown between fields and homestead.

THE GUIDEWAY SYSTEM OF STEAM CULTIVATION has been described in detail in a paper read by the exhibitor before the Society of Arts, in December, 1858, and published in its Journal. Persons who are desirous of knowing more of the system than can be shown by the model, or explained in the catalogue, are referred to that paper. It is sufficient here to state that the system consists in laying down at intervals of fifty feet or more, permanent guideways or rails, upon which a locomotive cultivator is supported and guided. This cultivator carries the motive power, and has attached beneath it the various implements that are required for the agricultural operations.

By this system every kind of field work can be most efficiently performed, a large concentration of power is obtained, and with very few hands a great amount of acreage is completed in a day, the soil is deeply and thoroughly worked and comminuted, and a fine tilth is the result, which is never trodden on by the foot of men or horses, or compressed by the wheels of carts and implements.

The cost of laying down the permanent way is £20 per acre, but this outlay is much more than compensated by the great economy of the operations, while large profits will be realized by the much increased produce raised by the great superiority of the cultivation.

The following is a list of the operations which the exhibitor has performed by steam:—ploughing, subsoiling, grubbing, rolling, clodcrushing, harrowing, finely comminuting the soil, drilling seed, hoeing crops, reaping corn, carting, watering.

No. 1. The model shows how the fields of a farm so laid down are connected with the homestead, and how the engine-power is brought to the barn for thrashing, &c., and how the trucks carry the produce and manure to and from the homestead.

No. 2. This drawing shows a modification of the guideway system in which the travelling cultivator is drawn by a rope from a distance, the engine power being stationary on the ground.

No. 3. This drawing shows a modification of the system especially suitable for our colonies and for countries where land can be cheaply obtained in large tracts, but where labour is scarce. The motive power used is a traction engine, travelling on a narrow strip of grass land. Much wider cultivators are used, much lighter rails, and the cost of the system is reduced to £2 10s. per acre. From a series of experiments, it appears that with the present traction engines one apparatus could plough 60 acres per day, and harvest (on the Australian system), the ears of 400 acres of wheat, performing other operations with equal celerity. One man only for the annual cultivation would be required for every ten now employed. The facility of superintending a few well-paid men with machinery, would enable large capitalists to embark in the business of agriculture; and one most important point for such countries, is that crops, as well as being raised, would be harvested by these few men. In Spain, Hungary, Poland, and Russia, the system would be a very valuable one; and in Australia and in America, where land rises in value with great rapidity when brought into cultivation, the ratio at which a certain amount of capital would increase annually if embarked in this patent, would be without doubt a very great one. The whole outlay would be often far more than paid in the first year's crop, and the field for the enterprise would be practically unlimited.

Persons desirous of further information are referred to the exhibitor's agent, Mr. Edward Weir, 142 High Holborn.

[2124]

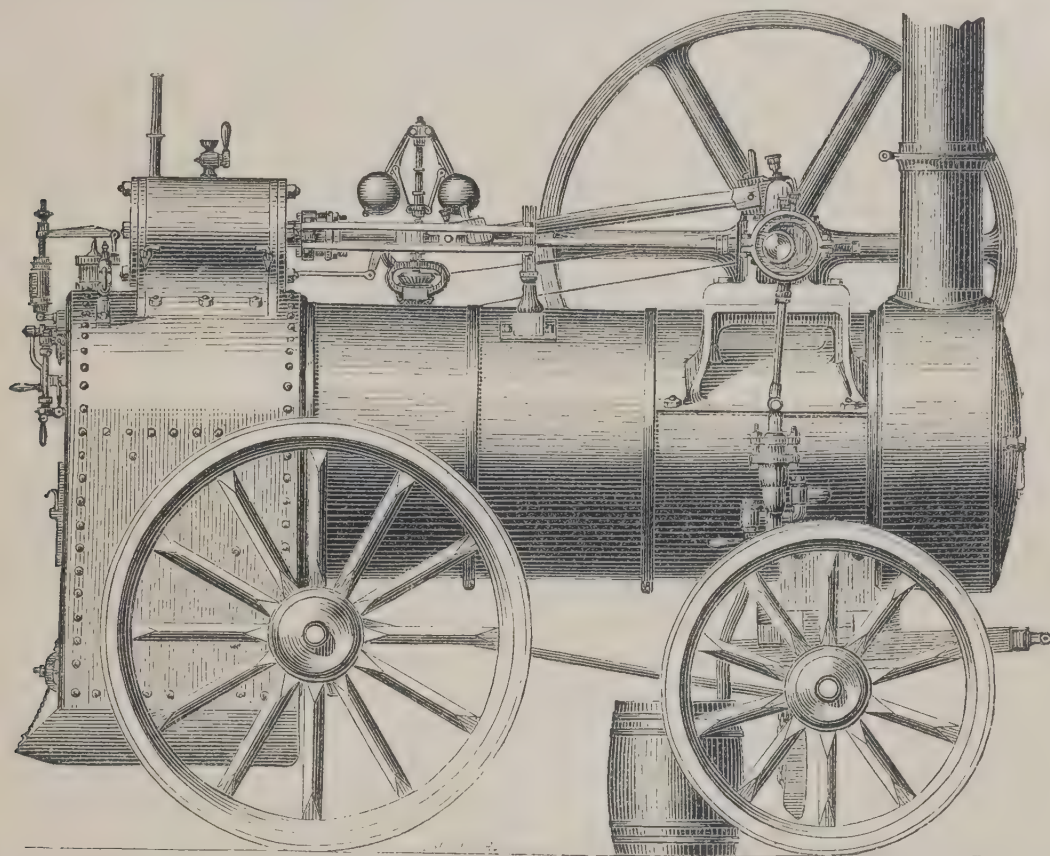
HANCOCK, J. & F. & Co., *Tipton Green, Furnaces, Staffordshire*.—Pulverising plough; butter machines; steam plough; windlass for hauling implements. (*See page 45.*)

[2125]

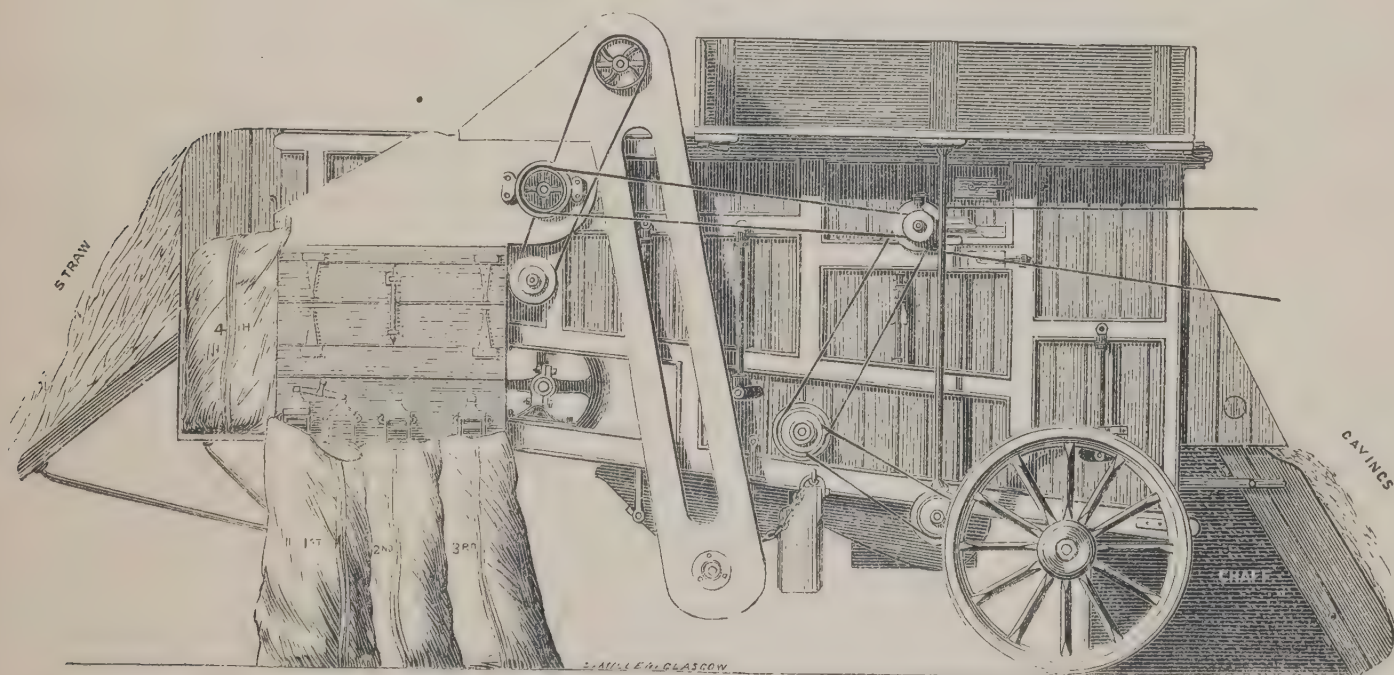
HAYWOOD, JAMES, JUN., *Phoenix Foundry, Derby*.—Cast-iron ornamental vases and chairs.

The exhibitor manufactures portable and fixed steam engines of all sizes, combined portable thrashing machines, grinding mills, chaff cutters, &c.

GRAY, JOHN, & Co., *Uddingston, near Glasgow.*—Agricultural implements, machines, and engine. *Obtained a Prize Medal at the Great Exhibition, 1851.*



No 1. 8-HORSE POWER PORTABLE STEAM ENGINE for agricultural and other purposes, £225.



No. 2. PORTABLE THRASHING AND FINISHING MACHINE, delivering corn in bags ready for market, £110*

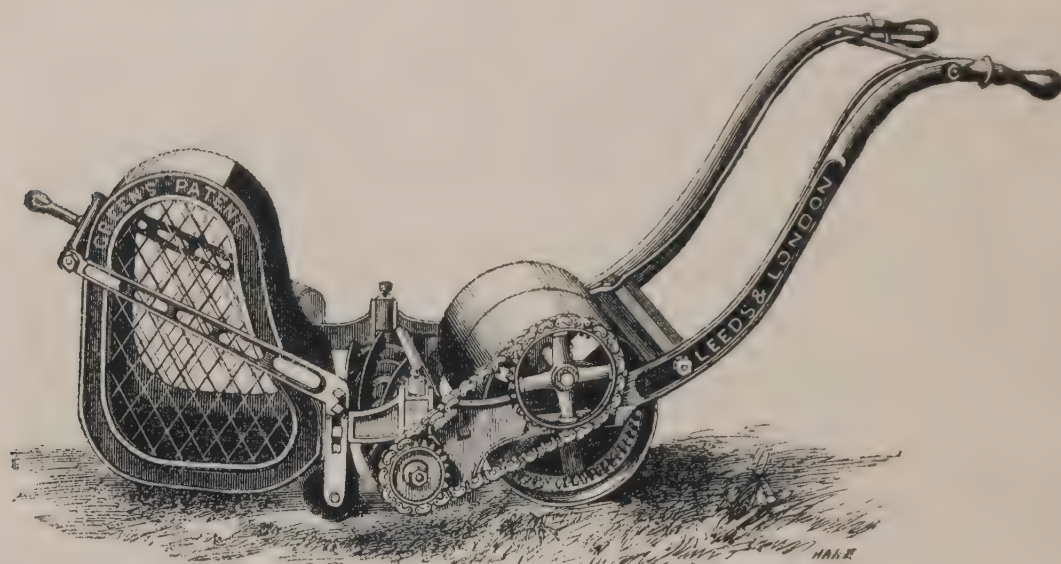


No. 3. 2-HORSE PLOUGH, for general purposes, strongly framed of wrought iron, can be used as a swing or wheel plough,—as swing plough, 95/; as wheel plough, 102/6; with improved steel mouldboard, 7/6 extra.

4. 2-HORSE SWING PLOUGH, 85/ : with wheel, 92/.
5. TURNWREST PLOUGH, 220/.
6. DEEP-SOIL PLOUGH, with steel mould, 150/.
7. GRAY'S IMPROVED ANGLED IRON HARROWS, 84/.
8. IMPROVED ZIG-ZAG IRON HARROWS, 3 in set, 85/.
9. LEVER SUBSOIL PULVERISER, 2 or 3 horses, 140/.

10. 3-HORSE FIELD GRUBBER, improved leverage. 210/.
11. DRILL GRUBBER, for pulverising between drills of root crops, with improved bridle, 85/.
12. IMPROVED CHAFF CUTTER, for power, 200/.
13. IMPROVED OAT BRUISER, for power, 220/.
14. IMPROVED 2 AND 3 HORSE YOKES, &c.

GREEN, THOMAS, *Smithfield Iron Works, Leeds, and Victoria Street, Holborn, London.*—
Green's patent lawn-mowing machines.



LAWN-MOWING MACHINE.

These machines now stand unrivalled, having improvements of the most important character (which have been secured by Her Majesty's royal letters patent for 1862).

By the use of these machines lawns can be brought to a state of perfection, unequalled by any other means; they are simple, durable, and effective, and are made in sizes suitable for the smallest plots, or lawns of the greatest extent.

Manufacturer of portable steam engines, sawing and wood-working machinery, iron roofing, fire-proof, and horticultural buildings.

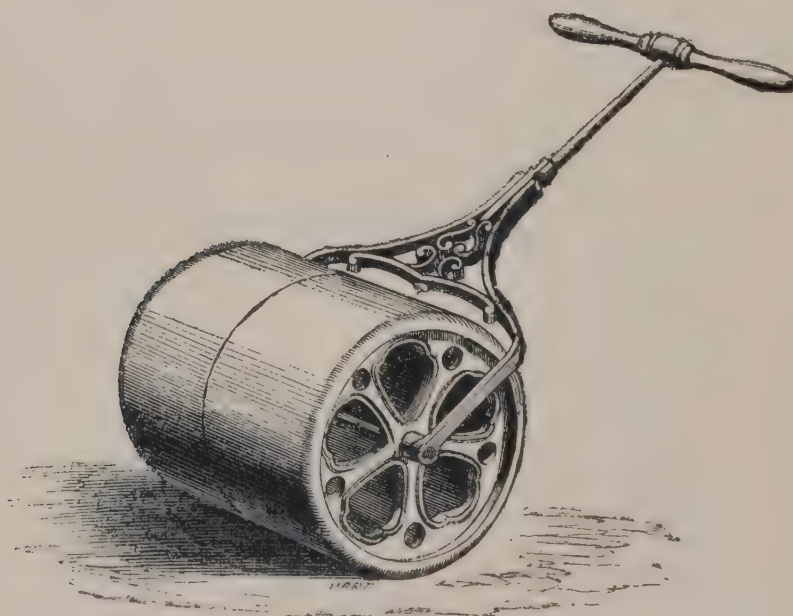
Heating and ventilating apparatus on the most approved principles.

Entrance gates, field gates, iron and wire fencing, palisading, plain and ornamental iron and wire work of every description.

Hare, rabbit, poultry, and game netting.

Thomas Green keeps agricultural and horticultural implements of every description in stock.

Illustrated price lists will be sent free on application.



GREEN'S NEW PATENT GARDEN ROLLER.

GREEN'S NEW PATENT GARDEN ROLLER.

These garden rollers are made in two parts, and are free to revolve on the axis, the outer edges are rounded off or turned inwards, thus avoiding the unsightly marks always left by the use of the old form of roller; they can be used by the most unskilful workman, with the greatest certainty of producing a beautifully even sur-

face, whether used upon lawns or on gravel paths, and for the bowling green and cricket field, are really indispensable. They are manufactured of the best materials, and finished in a superior manner.

Illustrated price lists will be sent free, on application to Thomas Green, Smithfield Iron Works, Leeds; and No. 2 Victoria Street, Holborn Hill, London, E.C.

HANCOCK, J. & F. & Co., *Tipton Green Furnaces, Staffordshire*.—Pulverising plough; butter machines; steam plough; windlass for hauling implements.

THE FOLLOWING ARTICLES ARE EXHIBITED :—

1. HANCOCK & Co.'s PATENT PRIZE PULVERISER PLOUGH.

This implement is used for making a seed-bed at one operation, on any kind of soil. It is a triple trenching plough, one share working below the other, and instead of ploughing land into clods, ploughs it into a good tilth, and makes a perfect seed-bed, every yard it works.

The turn-furrows are removable, by which any depth of soil may be turned, or none at all. It is worked from 3 to 12 in. deep, with 2, 3, or 4 horses, just in the same way as the common plough.

Price £6 10

2. Is a modification of the above for steam-power.

It is arranged to work without turning at the head-lands, and takes a double furrow and makes a seed-bed at one operation.

Price £25 0

3. HANCOCK'S PATENT REGULATING WINDLASS.

This arrangement will double the hauling power of the engine without stopping up hill, and through irregular, heavy, or wet patches of ground; the hauling drums are mounted on, and keyed to independent shafts, and each drum is acted on by two speed "clutches." By this contrivance, a common 8-horse power engine will be enabled to master all the difficulties of steam tillage.

Price £100 0

4. HANCOCK'S PATENT PRIZE BUTTER MACHINE separates all traces of acid and milk from butter without touching it with the hand. It also cools it, and will make it crimp in the hottest weather. Price . £2 12

Electro-plated £5 0

No. 2 ditto 2 2

Electro-plated 4 0

HAYWARD TYLER & Co., 85 *Upper Whitecross Street, London*.—Garden engines, conservatory pump, syringes, fountain jets.

The prices of the manufactures exhibited are sub-joined:—

Garden engine with 28-gallon oak tub, and registered spreader £5 15 0

Small garden engine, with galvanized iron tub to hold 12 gallons 2 10 0

Oval galvanized iron tub engine, to hold 16 gallons 4 4 0

Small ditto ditto . . 12 gallons 2 10 0

Ditto ditto . . 10 gallons 1 15 0

Conservatory engine 3 3 0

Conservatory pump 2 10 0

3½-inch double fire or manure pump, on wheels 7 0 0

Lift pump, on oak plank, 2½ inch . . . 5 12 6

Read's patent garden syringe 0 15 0

Common garden syringe, with rose and jet £0 7

Strong garden syringe, with rose and jet . 0 9

Strong garden syringe, with improved rose and jet 0 12

Small or ladies' syringe 0 6

FOUNTAIN JETS.

Prince of Wales feathers, large, 7/6, small, 5/0.

Crown „ 7/6 „ 5/0.

Barker's mill „ 17/6 „ 6/6.

Convolvulus „ 8/6 „ 5/0.

Sheet „ 8/6 „ 5/0.

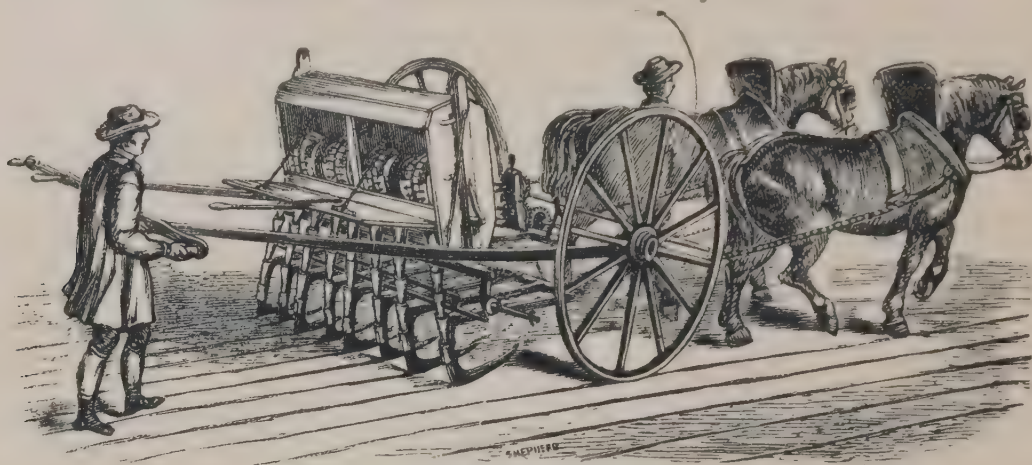
Reverse sheet „ 8/6 „ 5/0.

Fountain basket with jet „ 15/0 „ 10/0.

[2126]

HENSMAN, WILLIAM, & SON, *Linslade Works, Leighton Buzzard, Beds.*—Patent ploughs, prize corn and seed drills, &c.

Obtained Prize Medal at the Exhibition of 1851.



THE "WOBURN DRILL."

WILLIAM HENSMAN & SON recommend to the attention of agriculturists their pair-horse steerage, corn, seed, and manure drill, known as the WOBURN DRILL. In addition to the medal of the Great Exhibition, and prizes at the meetings of various societies in intermediate years, it obtained in 1861 the prizes of the Royal Agricultural Society of England, of the Bath and West of England, and of the West Middlesex Societies.

This implement is adapted to all kinds of grain and seeds, and may be used on any land, possessing this great advantage—that the corn-hopper is self-acting, and delivers the seed with as great regularity when traversing a hilly district, as when employed on a level plain. The delivery of seed is most accurate, and exceedingly easy of management; the coulter can be set to any

distance apart; and the steerage is the most complete yet introduced.

8-coulter cup drill as above, complete for corn and seeds. Price £20 0
6-coulter cup drill as above, complete for corn and seeds. Price 18 0

W. Hensman & Son also request attention to their improved land presser, which obtained the first prize of the Royal Agricultural Society at the Leeds Meeting, 1861. It is fitted with drill and hoes, so as to press the land, drill the corn, and cover it in at one operation. It is a very efficient implement on light lands.

Price, with drill and hoes £13 10

An illustrated catalogue may be obtained post-free by application.

[2127]

HEREMAN, SAMUEL, 7 *Pall Mall East, London.*—Sir Joseph Paxton's patent hothouses for the million.



These HOTHOUSES are made of the very best seasoned red deal, and as the sashes are much stronger than those generally used in ordinary old-fashioned structures, they will, if properly erected, stand as permanent buildings proportionably longer. Whilst thus suited for a permanency, they are also particularly adapted for persons having temporary tenures, as they can be so fixed that at the expiration of a tenancy they may with ease be packed

up and removed like any other furniture. Their moderate cost places them within the reach of all. As span-roofs, they are adapted for orchard houses, vineries, pineries, and indeed every horticultural purpose; and to all who have walls already standing they offer immense advantages, as they can be formed into ranges of lean-to houses, with facility and at an extremely low cost.

[2128]

HILL & SMITH, *Brierley Hill, Staffordshire*.—Patent continuous iron fencing and hurdles, prize wrought-iron land rollers.

[2129]

HOLMES & SONS, *Norwich, Norfolk*.—Prize corn, seed, and manure drills ; portable engine ; thrashing machine ; seed sheller. (See page 48.)

[2130]

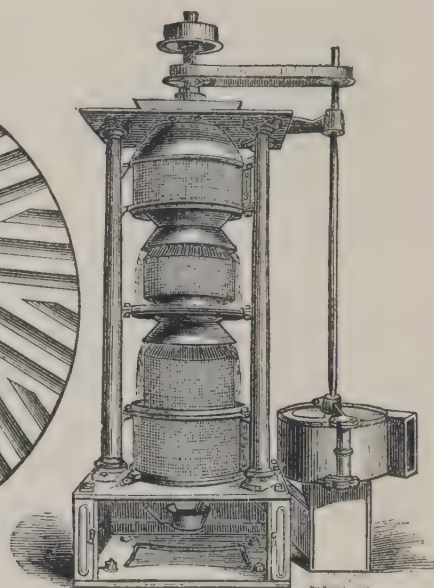
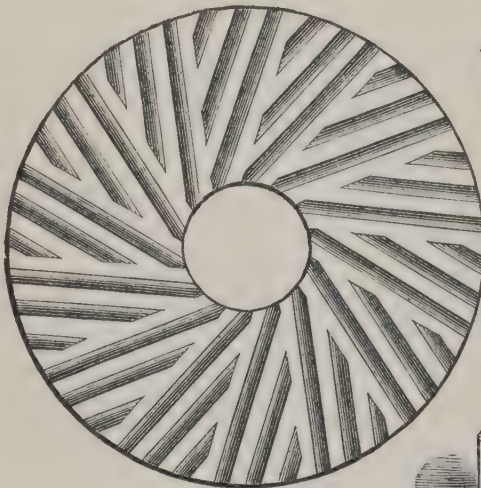
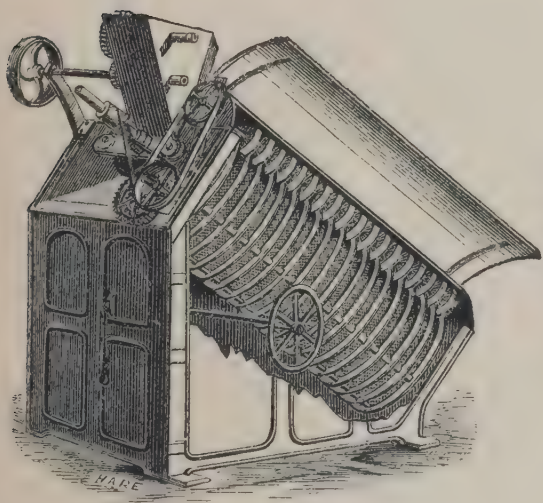
HORNSBY, R. & SONS, *Spittlegate Iron Works, Grantham*.—Improved patent prize portable and fixed steam engines, agricultural implements and machinery. (See pages 49 to 60.)

[2131]

HOWARD, JAMES & FREDERICK, *Britannia Iron Works, Bedford*.—Steam ploughs, steam cultivators, ploughs, harrows, horse rakes, hay-making machines. (See pages 62 and 63.)

[2132]

HUGHES & SONS, *Dover Road, and 29 Mark Lane, London*.—French burr millstones ; flour-dressing and grain-cleaning machines.



J. HUGHES & SONS have an extensive stock of French millstones, made from a very superior quality of burr, obtained from quarries recently discovered in France, and which, for workmanship and finish, cannot be excelled.

J. H. & Sons are also importers of Cologne stones, Granite peak, and grindstones direct from the quarries. Have always on hand at Mark Lane an assortment of flour-dressing machines, patent grain cleaners and bolting machines, best machine wire for cylinders, screen and kiln wire, square and round smut wire, wove by machinery ; bolting cloths ; best leather millbands ; iron and brass

sheave blocks ; metal provers and staffs ; corn and flour sacks ; measures ; machine brushes, all bristle ; sack and heaving barrows ; mill bills ; and all other articles used in mills.

Hughes & Sons employ none but the best workmen ; and, employing no travellers, avoid the necessarily high expenses connected therewith ; and are thus in a position to give their customers all the advantages from this circumstance, as well as those arising from adequate capital, combined with practical judgment.

All goods are delivered free to wharves or railways in London.

[2133]

HUGHES, HENRY, *Regent Street, Loughborough*.—Improved bee-hive.

1. The hive is completely impervious to the weather.
2. The interior of the hive is less acted upon by changes of temperature, hair felt being inserted between the inner and outer casings.
3. The depriving hive is fitted with bars, by which each comb can be examined or removed at pleasure.

4. An improved feeding trough, by which the bees can be fed at the top of the hive at any time and under any circumstances.

5. The hive is mounted on a stand of iron, which will keep it free from the attacks of vermin.

[2134]

HUMPHRIES, EDWARD, *Pershire, Worcestershire*.—6-horse portable steam engine, and two combined finishing thrashing machines.

Manufacturer of the celebrated COMBINED THRASHING MACHINES, which have obtained the first prize at the Bath and West of England's Society's Meetings for six

years in succession. Also the £20 prize at the Royal Agricultural Show at Canterbury. Price . . £93 0
Illustrated priced catalogues on application.

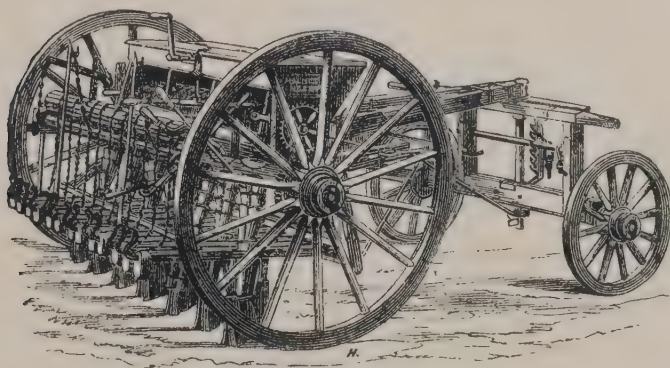
HOLMES & SONS, *Norwich, Norfolk*.—Prize corn, seed, and manure drills ; portable engine thrashing machine ; seed sheller.

Obtained Prize Medals at the Exhibition of 1851.

These exhibitors maintain their high position in the manufacture of corn and seed, seed and manure drills, and manure distributors. At the Royal Agricultural Society's last meeting at Leeds they had awarded to them the Society's Four Prizes.

For the best seed and manure drill, ridge or flat—
The highest prize of £10.
For their best corn and seed drill—The prize of £5.
For their manure distributor—The prize of £3.
For their small seed drill—The prize of £3.

No drill trials having taken place since the year in which H. & Sons had awarded them the Three First prizes for the best corn drill ; 3 prizes for manure distributor ; and prizes for seed and manure drill.



CORN DRILL.

They now have received over 60 awards from the Royal Agricultural Society of England, Bath and West of England Agricultural Society, and Norfolk Agricultural Society.

They also obtained the first-prize medal of the Great Exhibition of 1851 for the best steam-power portable thrashing machine.

Prices of the prize drills as above :—

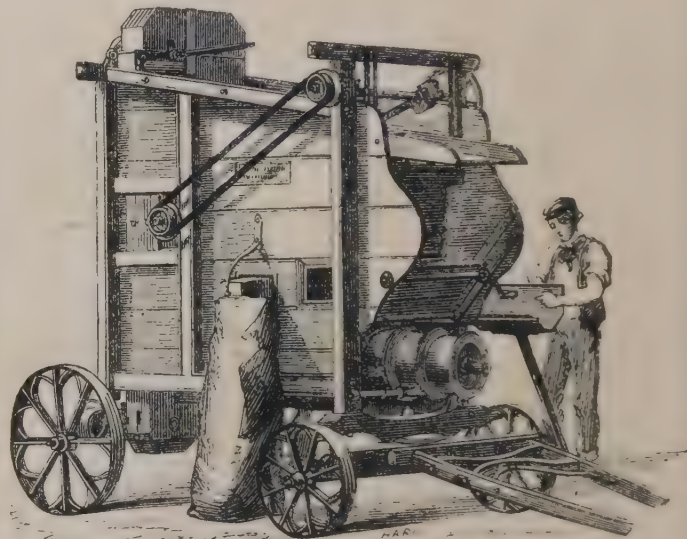
No. 1. The Leeds and Salisbury prize manure distributor	£14 14
No. 2. The Leeds and Salisbury prize corn drill, 11 rows at 6 in. wrought iron levers Fore carriage steerage to fit drill for broad work	23 12 4 0
No. 3. The Newton Abbots prize small occupation corn drill	18 0
Fore steerage to ditto, extra	4 0
No. 4. Improved general purpose drill for 8 rows of corn without manure, 6 in. apart 6 ditto corn with manure, 8 in. ditto 4 ditto turnip or rape seed, 13½ in. ditto 3 ditto ditto 18 in. ditto 2 ditto swedes or mangold on the ridge, 27 in. apart } Having extra sets of levers and coulter for each purpose.	32 10
No. 5. The Leeds prize seed and manure drill, ridge or flat, with ridging rollers and double-action wrought-iron levers	25 0
No. 6. A small hand drill for seed without manure	2 0

Upwards of 4,000 drills have now been manufactured by Holmes & Sons, a fact, which is an additional guarantee of their being approved.

H. & Sons had the honour of receiving at the Great Exhibition of 1851, the first-prize medal for the BEST PORTABLE STEAM-POWER THRASHING MACHINE, and they would now call especial attention to their

No. 7. NEW COMBINED PORTABLE MACHINE, which separates the chaff from the corn, delivers the chaff into large bags, cleansed from dust and seeds, as well as the corn into the sacks. This arrangement effects a considerable saving in labour ; the chaff is more easy of removal, and there is much less waste of corn than by any other arrangement. Fitted with patent beaters, and on wood travelling wheels. Price . . . £100 0

No. 8. IMPROVED 8-HORSE POWER PORTABLE STEAM ENGINE. For durability, efficiency, first-class workmanship, and small consumption of fuel, these engines are gaining a very high reputation. They are fitted with double expansive valves, steam indicator, and whistle £245 0



PORTABLE SEED SHELLER.

No. 9. PRIZE PORTABLE SEED SHELLER (New machine, received special award at Cardiff).

From the very many testimonials H. & Sons have received from gentlemen who have been supplied with these machines, there is no question about their being very far in advance of any other machine for the purpose now before the public.

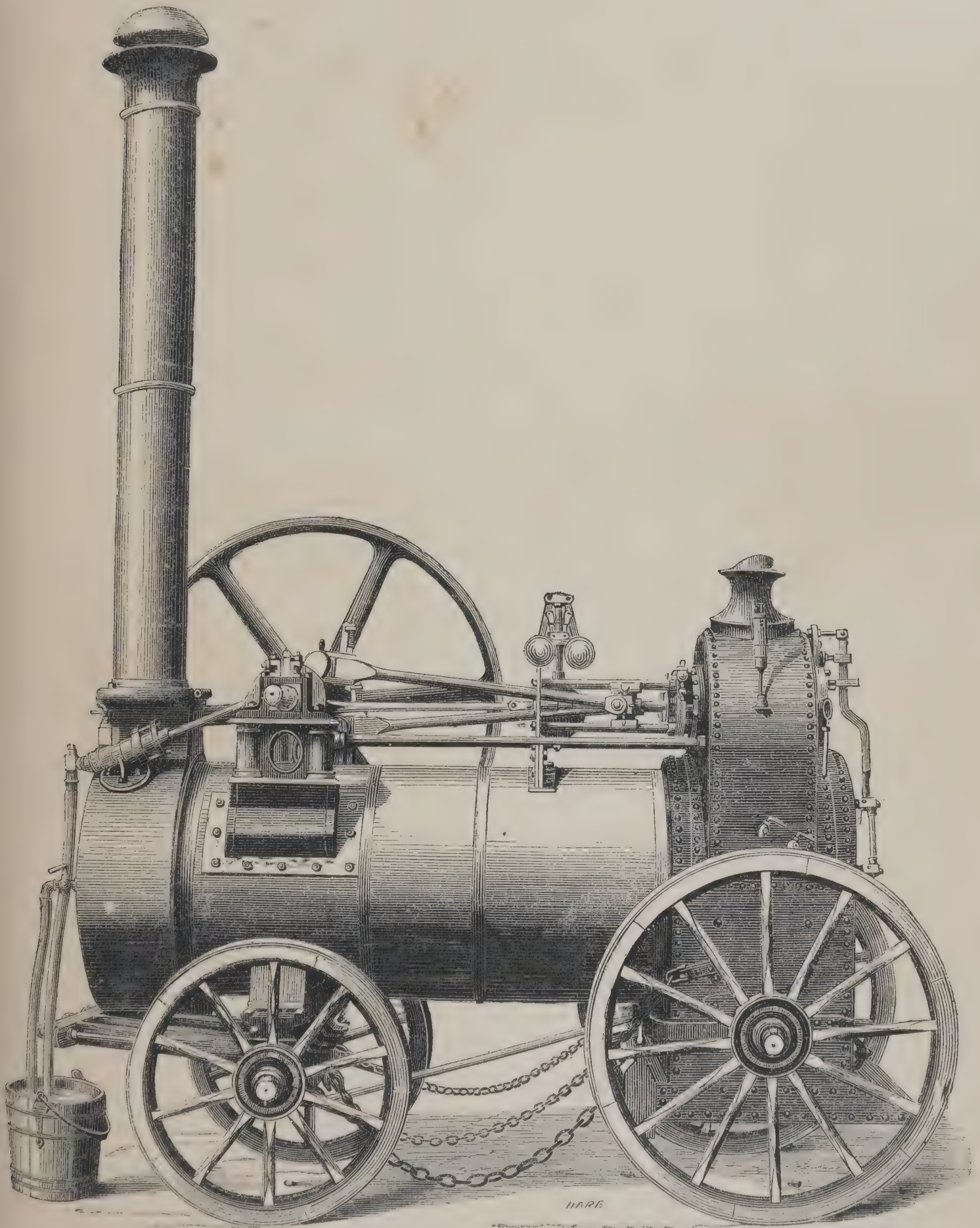
On wood wheels £55 0

No. 10. IMPROVED CIRCULAR SAW TABLES, fitted up with every regard to wear and steadiness of the saw when in work. The large benches, with self-acting feed motion to the saw, are the most complete and portable that can possibly be. (See H. & Sons' Catalogue, pages 29—31.)

Strong table, with 36-in. saw and rollers at end £20 0
Extra for boring apparatus 3 10
Extra for loose pulley and throwing-out lever 1 10
If fitted with improved fence to cut at any angle, extra 1 10

No. 11. HOLMES & SONS' CORN DRESSING AND WINNOWER MACHINE, of which 3,000 have been manufactured, still hold their position. They are simple turn easy, and make a good sample. Price . . . £9 5

HORNSBY, RICHARD, & SONS, *Spittlegate Iron Works, Grantham.*—Improved patent prize portable and fixed steam engines, agricultural implements and machinery.



R. HORNSBY AND SONS' PATENT PORTABLE DOUBLE-CYLINDER STEAM ENGINE.

PORTABLE STEAM ENGINES have been a leading manufacture with R. Hornsby & Sons since their introduction, and they can refer with confidence to the proud position taken by them at every competition, in proof of their unapproachable excellence.

Their superiority has now been tested, not only by public trials at the principal meetings throughout the world, but by successful increasing use in the farm-yards of every country, where for years past they have proved themselves the best in principle, the simplest and most

HORNSBY, RICHARD, & SONS, *continued.*

durable in construction, and the most economic in consumption of fuel that engineering skill and first-class workmanship can produce.

These great advantages are attained by their patent principle, on which the cylinder and pipes connected with it, are placed inside the boiler or steam chamber, protecting them from weather, preventing all condensation in the cylinder, rendering the engine compact, simple, and easy of management.

In engines with the cylinder outside the boiler, the water in the cylinder, pipes, and pumps, in the winter season, frequently becomes frozen, and even with the greatest care on the part of the person in attendance, much injury is done, or time lost.

On the other hand, in cases where the cylinder is placed for protection inside the smoke box, a greater complication and weight of parts is necessary, by the smoke box having to be made sufficiently strong to take the whole strain of the engine, and increased in size so as not to impede the draught. The advantages therefore of R. H. & Sons' patent engines (which from their construction are exceedingly strong, powerful and light), are not obtained; and so far from engines so fitted being any easier of access in case of examination or repair, it was satisfactorily proved by the engineer of the Royal Agricultural Society, at the trials of the Bath and West of England Meeting, at Bath, that the complete withdrawal of piston, slides, and all the working parts, could be effected in a less time with R. H. & Sons' engine, than with an engine with the cylinder inside the smoke box.

They are manufactured with double or single cylinders, with link motion reversing gear, or with improved fraction gear; and are adapted for the use of the farmer, contractor, builder, exporter, and for every purpose to which steam power can be applied.

The following prizes have been awarded to R. Hornsby & Sons, for their improved patent portable steam engines:—

By the Royal Agricultural Society of England, at its last trial at Chester, the first prize of £25.	
By the Imperial Royal Agricultural Society of Austria, at Vienna, the gold medal.	
By the Hungarian Agricultural Society, at Pesth, the highest diploma of merit.	
By the Agricultural Society of Gers, at Condom, the gold medal.	
By the Manchester and Liverpool Agricultural Society, at Warrington, the first prize.	
At the Universal Exposition at Paris, 1856, the first prize of £24 and gold medal, for the best portable steam engine for agricultural purposes.	
At the Universal Exposition at Paris, 1855, the medal of honour for the best portable steam engine.	
At the Great Exhibition of the industry of all nations, held at the Crystal Palace, Hyde Park, London, 1851, for the best portable steam engine for agricultural purposes, the first prize or council medal.	
By the North Lincolnshire Agricultural Society, Boston, August, 1855	£20 0
By the Bath and West of England Agricultural Society, at Tiverton, June, 1855	10 0
By the Royal Agricultural Society of England, at Lincoln, July, 1854	20 0
By the Bath and West of England Agricultural Society, at Bath, June, 1854	10 0
By the Selby and Tadcaster Agricultural Society, at Selby, July, 1854	20 0
By the Herts Agricultural Society, at Hertford, October, 1854	5 0
By the Great Yorkshire Agricultural Society, at York, August, 1853	12 10
By the North Lincolnshire Agricultural Society, at Gainsboro', July, 1853	20 0
By the Royal Agricultural Society of England at Gloucester, July, 1853	10 0
By the Bath and West of England Agricultural Society, Plymouth, June, 1853	15 0

By the Royal Agricultural Society of England, at Lewes, July, 1852	£40 0
By the North Lincolnshire Agricultural Society, at Horncastle, July, 1852	7 0
By the Great Yorkshire Agricultural Society, at Sheffield, August, 1852	15 0
By the Royal North Lancashire Agricultural Society, at Preston, August, 1852	5 0
By the North Lincolnshire Agricultural Society, at Horncastle, July, 1852	20 0
By the North Lincolnshire Agricultural Society, at Caistor, July, 1851	20 0
By the Great Yorkshire Agricultural Society, at Bridlington, August, 1851	15 0
By the Royal Agricultural Society of England, at Exeter, July, 1850	50 0
By the Royal Agricultural Society, at York, July, 1848	50 0
By the North Lincolnshire Agricultural Society, at Lincoln, July, 1848	20 0

R. H. & Sons beg to direct attention to the report of the judges at the last trial of the Royal Agricultural Society, where they had the honour of receiving the first and principal prize of £25.

In speaking of R. H. & Sons' prize engine, the judges remark, "Our award of the first prize to Messrs. Hornsby & Sons, of Grantham, was determined mainly by the quality and design of their engine. Its arrangements were of a superior description, and the details of its fixed and working parts exceedingly well proportioned."

"The engine worked up to its full power at a less pressure of steam than the others, and is better fitted for the variable service required from it on the farm, by reason of its possessing fuller command over its work. We believe that the advantage possessed by the other engines in respect to their lower consumption of fuel would be found to disappear in actual service, when the appliances for reducing the area of their fire-grates would be removed. The fire-grate of Messrs. Hornsby & Sons' engine was in its ordinary state."

R. HORNSBY & SONS' IMPROVED PATENT COMBINED THRASHING, SHAKING, AND DRESSING MACHINES, for either portable or fixed purposes—preparing corn for market at one operation.

R. Hornsby & Sons' thrashing machine was awarded the first prize of £20 by the Royal Agricultural Society of England, at its last trial of thrashing machines at Chester, being the highest prize awarded for thrashing machines.

R. Hornsby & Sons' new patent combined machine is introduced by them with great confidence from the improvements it offers over any yet brought out. After a long series of experiments conducted with a special view to simplifying the machine and increasing its efficiency, they have succeeded in completing an entirely new arrangement of thrashing, shaking, elevating, blowing, and dressing machinery, having an improved patent corn elevator of the most perfect construction, new patent shaker, and other important features, and performing the whole of these operations with only one belt, and without gearing; a result hitherto attained by no machine ever introduced, and which cannot from its very nature be surpassed.

By these great improvements the machine is rendered of the simplest character, the wear and tear are reduced to the lowest point. All complication is done away with, and the whole is thoroughly adapted for doing a large amount of work with little power, and at the least cost to the farmer.

The following advantages amongst others may be particularly referred to:—

Extreme lightness.—Each machine weighing nearly one ton less than hitherto, and being therefore much easier of removal.

Great simplicity.—The screws are entirely dispensed

HORNSBY, RICHARD, & SONS, *continued.*

with, and replaced by vibrating boards ; and, from the compactness and convenience of the internal arrangement, these boards are rendered much shorter than ordinarily, and therefore involve less wear and tear.

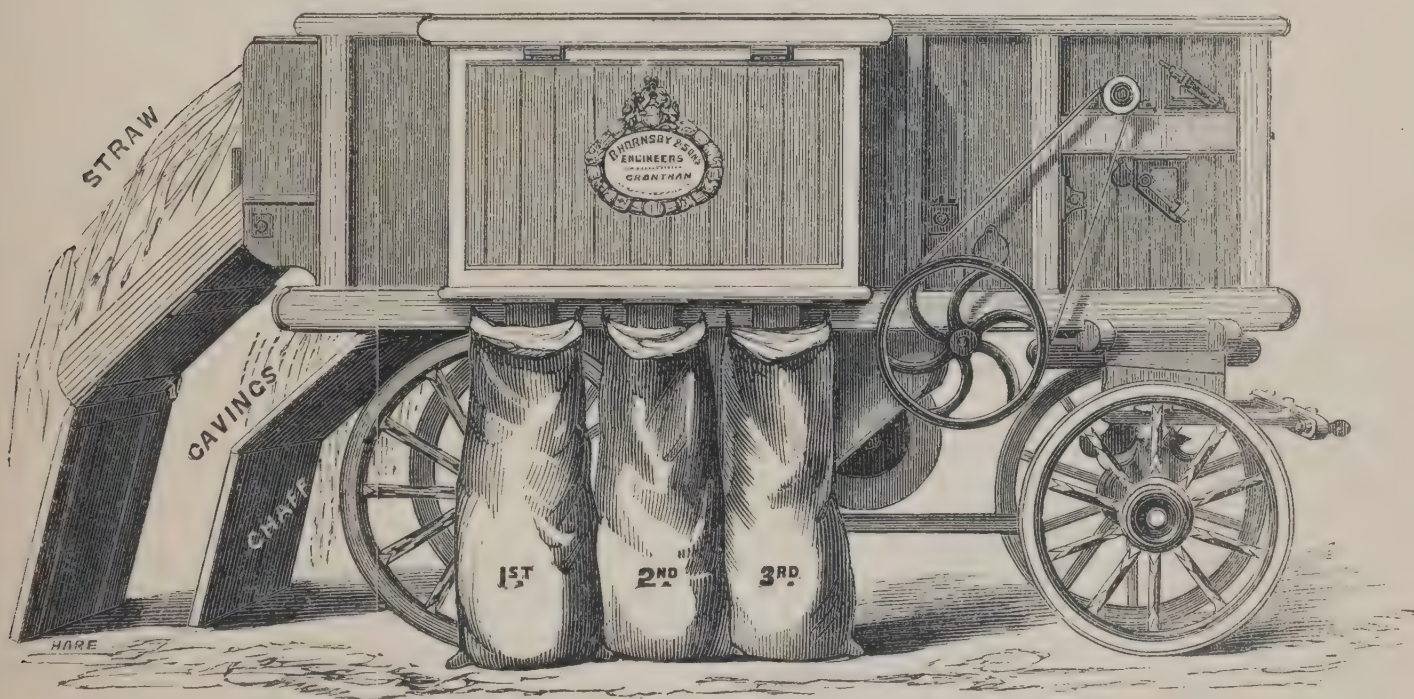
The utmost durability of parts.—This is obtained by several important features, to which R. H. & Sons invite special notice. It is well known to all concerned in such machinery how troublesome and expensive a part the shaker crank is, in every machine yet introduced, and how much time is lost, and cost frequently incurred, by the necessity for its renewal. In these machines, by patented improvements, the cranks are case-hardened, and consequently will give fully double the wear of any others, and a proportionate advantage be realized by their use. The newly-invented and patented cranks, by which the vibrating boards are worked, are also case-hardened, which is impossible in the ordinary manufacture. The boards are hung on patent globular links, which work easily, and retain the oil for a much longer period than in any others, and are driven by R. H. & Sons' patent rods, constructed of flexible wood, which need no attention, require no oil-

ing, and springing with their own movement, cannot possibly wear out or break.

Renewal of the cranks of the shaker and vibrating boards.—This is an important feature, when the cost of replacing either of the above-mentioned cranks is considered. In these machines the patented cranks are constructed in parts (case-hardened), so that when one bearing is worn, it can be removed and replaced without necessitating a new crank.

New improved shaker.—The machines are fitted with their improved patent "differential shaker," the action of which is entirely new and of the most effective character—shaking the straw with the least possible power, and in the most perfect manner.

New improved patent corn elevator and cleanser.—This novel corn elevator is exceedingly simple, requires the least amount of power, does away with a number of belts and wearing parts, and will be found the most perfect in operation. In fact, having in a finishing machine only one belt, which is less than in any machine yet brought before the public.



R. HORNSBY AND SONS' IMPROVED PATENT COMBINED THRASHING, SHAKING, AND DRESSING MACHINE.

With the numerous improvements in detail which have for some time occupied the attention of R. H. & Sons, and the extraordinary lightness, simplicity, durability, and efficiency of the machine as described, they can confidently bring it before the notice of the public as the most perfect in principle, and the most effective in operation ever brought out.

The following first prizes have been awarded to R. H. & Sons for their thrashing machines, at the meetings of the Royal and other Agricultural Societies :—

By the Royal Agricultural Society of England, at its last trial of thrashing machines, at Chester, the first prize of £20, being the highest prize awarded for thrashing machines.

The first prize of £10 by the Royal Agricultural Society of England, at Lincoln.

The first prize of £10 by the Highland and Agricultural Society of Scotland, at Glasgow.

The highest diploma of merit of the Hungarian Agricultural Society, at Pesth.

The gold medal of the Imperial Royal Agricultural Society of Austria, at Vienna.

The first prize of £20 at the Royal Agricultural Meeting, at Carlisle.

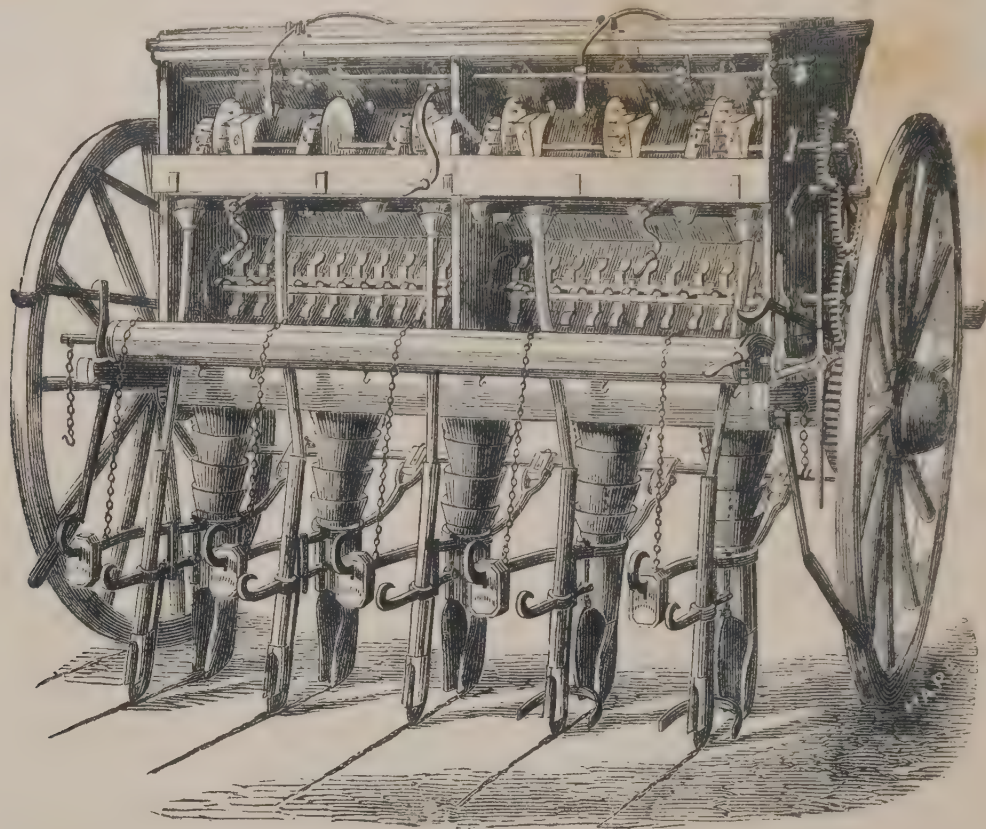
The medal of honour at the Universal Exposition, at Paris.

By the Manchester and Liverpool Agricultural Society, at Warrington, the first prize.

And numerous other first prizes from the Great Yorkshire, North Lincolnshire, and other Agricultural Societies.

The performance of R. H. & Sons' prize machine at the Royal Society's trials was noticed as follows in the report in *The Times* of July 26 :—"Messrs. Hornsby and Sons have succeeded in turning out a machine which on trial was found to 'thrash perfectly,' leaving no grain in the ear, and none being wasted, as is too often the case, in either the chaff, which was well separated, the straw, which sustained little or no damage in the operation, or the pulse. The machine seemed to do its work 'in all respects thoroughly.' The straw underwent a strict examination at many hands, but no waste was discovered ; and several practical farmers expressed themselves in terms of unqualified satisfaction at the result, having narrowly watched the process throughout."

HORNSBY, RICHARD, & SONS, *continued.*



HORNSBY AND SONS' PATENT PRIZE DRILL.

R. HORNSBY & SONS' PATENT PRIZE DRILLS for corn and seeds of all descriptions, with or without manure.

Since the important improvements introduced under recent patents, these drills are undoubtedly by far the best ever brought before the public. In other drills there is great imperfection in the most essential point, namely, the conveyance of the corn or seed to the ground. R. Hornsby & Sons' patent flexible india-rubber tubes remedy this defect, and supply a perfect conductor in the place of the clumsy and inefficient tin cups in ordinary use, the delivery through which must necessarily be irregular, especially in windy weather. The patent tubes constitute the greatest improvement ever introduced in drills, simplifying and rendering them more efficient. The seed being delivered down one elastic tube, neither wind nor rain has the least effect on it as it passes through the continuous tube with the greatest precision into the channel made by the coulter: all bouncing of the seed from one cup to another, which must be the case in drills where tins are used, is entirely done away with.

The general purpose drill is capable of drilling all descriptions of corn and seeds, with or without manure, in any required quantities, and at any distance apart. It is alike suitable to the various requirements of all farms.

The patent corn and seed drills are suitable to all methods of cultivation, will work upon any soil, and deposit corn and seeds at any distance apart. They are constructed with improved slides, for regulating the quantity of seed at the pigeon holes. The feed of every coulter can, by these means, be increased or diminished without stopping the drill; also, with two coulter bars, to equalize the pressure upon each coulter.

The patent prize drills for general purposes have received the following prizes:—

By the Royal Agricultural Society of England, R. H. & Sons' last trial at Salisbury, the first prize.

By the Universal Agricultural Exposition, at Paris, June, 1856, the first prize of £10 and the gold medal.

By the Universal Agricultural Exposition, at Paris, 1855, the medal of honour.

In addition to 9 other first prizes from the Royal Agricultural Society of England at its meetings at Lincoln, Lewes, Norwich, York, Newcastle-upon-Tyne, Shrewsbury, Derby, Bristol, and Liverpool, and upwards of 100 from the Great Yorkshire, North Lincolnshire, and other Agricultural Societies.

The patent corn and seed drills have received the following prizes:—

The council medal at the Great Exhibition of the industry of all nations, held at the Crystal Palace, Hyde Park, London, 1851.

The first prize of £10, and the gold medal, at the Universal Agricultural Exposition, at Paris.

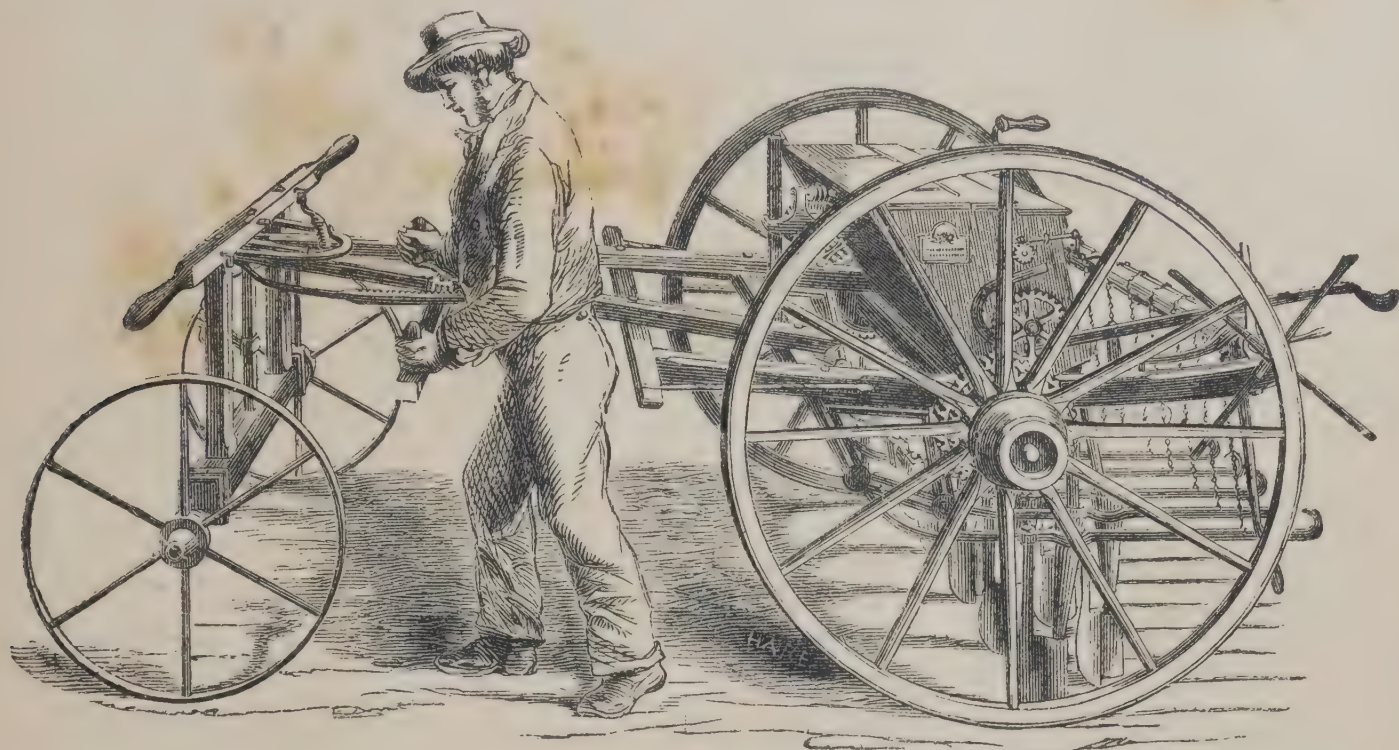
The medal of honour at the Universal Agricultural Exposition, at Paris.

In addition to 5 other first prizes from the Royal Agricultural Society of England at its meetings at Carlisle, Lincoln, Gloucester, Lewes, and Exeter; and upwards of 100 first prizes from the Royal North Lancashire, Bath and West of England, Great Yorkshire, and other Agricultural Societies.

R. Hornsby & Sons also manufacture patent drills for small occupations, patent drills for turnip or mangold wurtzel with manure, patent ridge drills of various kinds, and every description of drill for depositing corn seeds and manure on ridge or flat ground; to all of which an immense number of first prizes have been awarded by the various agricultural societies.

The Great Exhibition PATENT PRIZE CORN-DRESSING MACHINE.

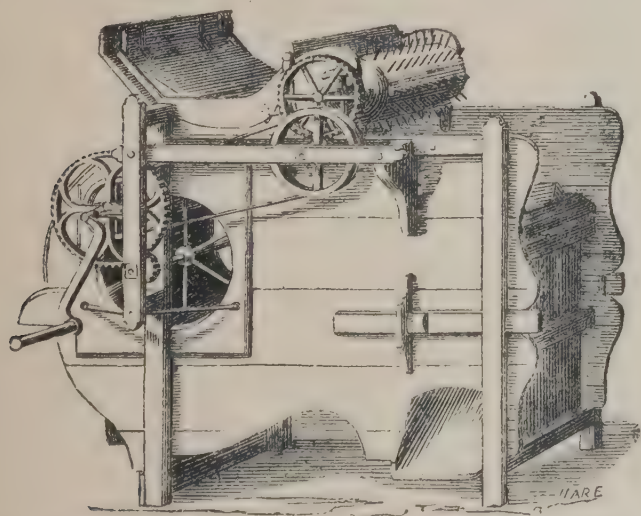
R. Hornsby & Sons have received 9 first prizes from the Royal Agricultural Society of England, and upwards of 150 from other agricultural societies, for their patent corn-dressing machines, being a far greater number than has been awarded to any other machine. The first prize of £5 was also awarded to R. H. & Sons by the Royal Agricultural Society of England, at its last trial at Chester; the medal of honour at the Universal Exposition, at Paris, in addition to 8 other first prizes from the Royal Agricultural Society of England at its meetings at

HORNSBY, RICHARD, & SONS, *continued.*

SIDE-VIEW OF THE GREAT EXHIBITION PRIZE CORN DRILL, WITH STEERAGE.

Carlisle, Lincoln, Gloucester, Lewes, Exeter, Norwich, York, and Newcastle-upon-Tyne, and upwards of 150 from the Great Yorkshire, Bath and West of England, North Lincolnshire, and other societies.

ADELAIDE AGRICULTURAL SOCIETY.—From the *South Australian Advertiser*, Wednesday, December 26, 1860.—“The judges awarded the prize to a Hornsby’s machine exhibited by the Messrs. Tuxford, and remarked that it is capable of being worked with a saving of labour in consequence of having a spiked roller on the top to feed the machine. It also divides the wheat better than any other machine, thus occasioning some saving in time.”



THE GREAT EXHIBITION PRIZE CORN-DRESSING MACHINE.

This improved and powerful dressing machine may be fitted with, or without a spiked roller working through a grating, so arranged as to form a hopper; and is easily adjusted to suit corn either in rough chaff or any other state. It is also fitted with a double shaking screen at bottom, which more effectually cleans the corn from all kinds of small seeds than a fixed one. For the second time over the strap is taken off, which puts the roller out of action; and a board placed in front of the grating makes it an excellent machine for finishing the corn for market. About 3,000 of these machines have been sent out, including a very large number to the colonies.

considerably exceeded their past successes, and gained an immense number of champion and first prizes, including 6 in competition with Messrs. Howard, of Bedford, and 6 with Messrs. Ransomes & Sims, of Ipswich.

Since their first introduction, they have surpassed any known implement in their success at every competition, and have rapidly taken their position as the best, simplest, and most efficient implements for the farmer’s use. The principal advantages of construction and arrangement for which these ploughs are remarkable, and which have gained them their high reputation, are—

1st. The *beam handles and frame* are one solid continuous piece of wrought-iron work, by which the usual cumbrous cast-iron body is dispensed with, and the utmost lightness, strength, and durability secured.

2d. The *lever neck* is of wrought-iron, for giving the share more or less “pitch,” and more or less “land” as may be desired. The joint is globular or spherical, and is therefore of immense strength, and does not allow of the least dirt working in.

3d. The *slipe or slide* is of patent arrangement, and serves for the frame or body, to which the lever neck is attached. It is of great durability, and will wear considerably longer than those in ordinary use.

4th. The *simple and perfect* mode by which the breast is fastened, and can be expanded or contracted at pleasure.

5th. The *shares*, which are made in different forms, suit any and every description of soil. They are constructed to work accurately in conjunction with the breast, and by simply changing them, the plough can be made to give any class of ploughing to suit all localities, and each variety of land.

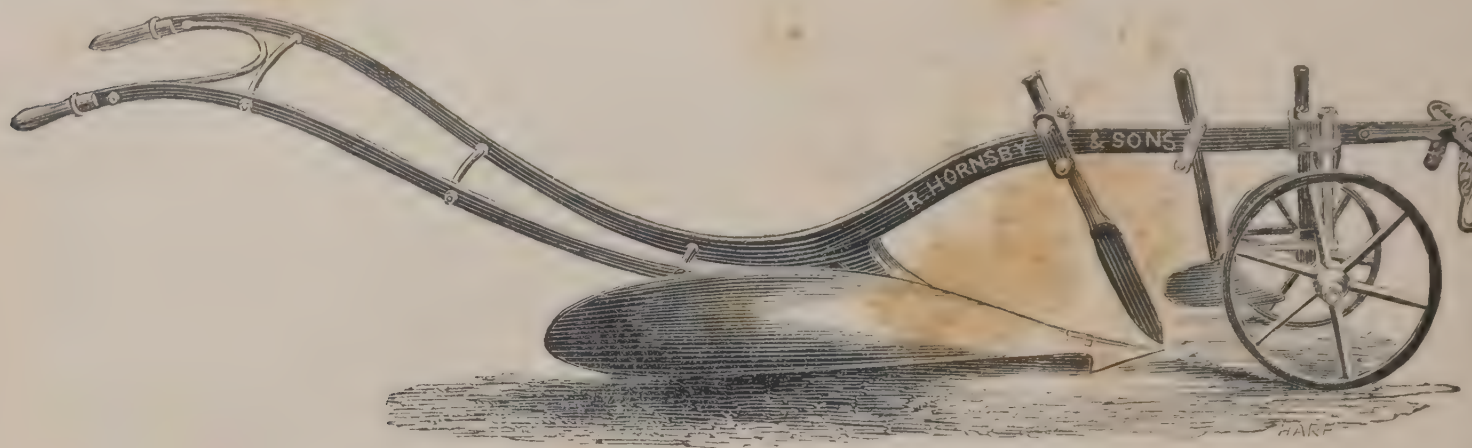
6th. The *coulter and coulter fastenings*, which are simple and effective, will cut in any position, as may be necessary to suit the variation in the share.

7th. The *wheels* are of novel construction, and have been recently patented. The old-fashioned long axle is done away with, and for it are substituted *discs*, working in suitable recesses, which prevent any oscillation of the wheel. Great steadiness is thus attained; the discs may be easily and cheaply replaced if necessary: they retain the oil and make the wheels self-lubricating, and are of great durability, as breakage of the wheel is rendered almost impossible.

R. HORNSBY & SONS’ IMPROVED ROYAL WARWICK CHAMPION PATENT PRIZE PLOUGHS, which last year,

R. Hornsby & Sons invite special attention to the following abstract of the successes of their Warwick royal

HORNSBY, RICHARD, & SONS, *continued.*



R. HORNSBY AND SONS' CHAMPION PATENT PRIZE GENERAL PURPOSE PLOUGH.

champion ploughs with their ploughman last season, in competition with those of Messrs. Howard, Ransomes, Page, Ball, and others.

R. Hornsby & Sons' ploughman, George Brown, has during 1861 been judged at 13 competitions, and taken 12 champion prizes, of which 6 have been gained, in competition with Messrs. Howard's ploughman Purser, and 6 in competition with Messrs. Ransomes and Sims' man Powell, viz. :—

At Berkeley and Thornbury, Gloucester, August 28, beating Messrs. Howard's man, with their latest improved plough.

At Sparkenoe, Leicestershire, September 11, champion class, beating Messrs. Howard's and Ransomes' men, with their latest improved ploughs.

At Sparkenhoe, separate trial for straight furrows, beating Messrs. Howard's and Ransomes' men, with their latest improved ploughs.

At Huntingdon, October 15, beating Messrs. Howard's and Ransomes' men, with their latest improved ploughs.

At Highnam, Gloucester, October 17, special silver medal, beating Messrs. Howard's and Ransomes' men, with their latest improved ploughs.

At Weobley, Hereford, November 14, sweepstakes of



R. HORNSBY AND SONS' CHAMPION PATENT PRIZE LIGHT LAND PLOUGH.

£22, beating Messrs. Howard's and Ransomes' men, with their latest improved ploughs.

At Bennington, September 27, beating Messrs. Ransomes' man, with their latest improved plough.

R. H. & Sons' ploughman and their Warwick royal champion plough have never this season been beaten by local men ; and having carried off more prizes, in competition with others, than any in England, are alone entitled to the name of champion.

ROSS MEETING.—R. H. & Sons' ploughman could not be present ; but the following, from the *Hereford Times*

of October 30, will show that their plough, in the hands of a local man, John Rees, carried off the palm for superiority of work :—

“The ploughing matches took place on the farms of Mrs. Barrett, of Overton, and Mr. John Cadle of Over-Ross farm. The interest of the competition was heightened by the presence of men from the celebrated implement firms of Messrs. Howard and Messrs. Ransome & Sims, whose ploughs, under the most favourable circumstances—as it is only reasonable to suppose that each firm takes good care to obtain the services of ‘crack’ ploughmen—



R. HORNSBY AND SONS' CHAMPION PATENT PRIZE PONY PLOUGH.

were thus brought into competition with those of our well-known local makers, the Messrs. Kell, which are very extensively used in the district. The result of the contest was the awarding of the prize to Messrs. Howard's champion ploughman, Frederick Purser ; but, when we state upon the authority of very competent judges, that the work of Purser and the majority of the ploughmen was not *very* first-rate, the contest will hardly be looked upon as a test of the comparative merits of the ploughs. If

such is to be the result, the palm of victory must unquestionably be awarded to Messrs. Hornsby, for the best ploughing of the day was that of John Rees, in the service of Mr. Dowle, near Chepstow, the champion ploughman of that district. He was, however, not entitled to take the prize, for the simple fact that he ploughed only half the allotted quantity of land, none having been apportioned to him on the ground, in consequence, we believe, of some informality or error in

HORNSBY, RICHARD, & SONS, *continued.*

the entry. As affording a test, however, of the ploughman's skill, his work was universally pronounced to be immeasurably superior to that of any other competitor, and but for the 'chapter of accidents' disqualifying him, he would have taken the champion's prize."

WILLITON AND DUNSTER PLOUGHING MATCH, October 30, 1861.—Special prize of £5 for champion ploughmen.—John James Warren, of Milverton, with one of R. Hornsby & Sons' ploughs, beat Messrs. Howard's ploughman, Purser.

The following are a few of the matches at which R. Hornsby & Sons' ploughs have last year been successful. A large number might be added from all parts of the Kingdom, for which they cannot find space.

Berkley and Thornbury, champion prize, against Messrs. Howard's man.

Sparkenhoe, champion, farmers' sons' cup, and other prizes, against Messrs. Howard's & Ransomes' men.

Huntingdon, champion prize, against Messrs. Howard's & Ransomes' men.

Highnam, Gloucester, champion prize, against Messrs. Howard's & Ransomes' men.

Weobley, Hereford, champion prize, against Messrs. Howard's & Ransomes' men.

Hitchin, champion prize, against Messrs. Howard's & Ransomes' men.

Bennington, champion prize, against Messrs. Ransomes' man.

Evercreech, champion, first, second, and third prizes. St. Neots, champion prize, against Messrs. Howard's man.

Derby, first prize.

Grantham, champion and other prizes.

Sleaford, champion and other prizes.

Waltham, champion and other prizes.

Wellingboro', champion and other prizes.

Metz, France, first prize.

West Riding of Yorkshire, first prize and extra ditto.

Bingham, Notts, champion prize, farmers' sons' cup, and other prizes.

Worksop, Notts, first prize.

Duloe, Cornwall, first prize.

Witheridge and Thelbridge, first prize.

Halberton, first and second prizes.

Upton, farmers' sons' cup.

Wellington, Wivelscombe, and Milverton, silver cup.

Bideford, champion prize and prize for the plough.

Chepstow, champion prize, by a local man, against the man who ploughed for Messrs. Howard at Hitchen and Luton.

Yarnscombe, two first prizes.

Huntsham, champion prize.

West Buckland and Bradford, silver cup, gained by Stephen Morgan.

Ropsley, first prize and silver cup.

Horncastle, champion, farmers' sons' cup, and the first prizes in every class.

Caistor, champion prize.

Alford, champion prize.

Wenlock, all the prizes.

Greasley and Silston, Notts, farmers' sons' cup.

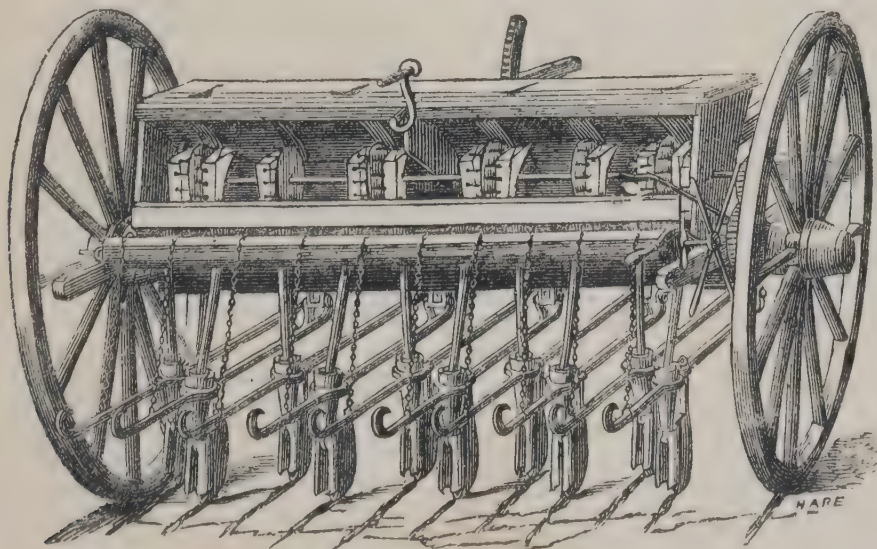
ROYAL AGRICULTURAL SOCIETY OF ENGLAND, Meeting at Warwick, July, 1859.—R. Hornsby & Sons have pleasure in referring to the unequalled success which has attended their competition, in the trials for ploughs at the above meeting, and beg to submit the award of the judges, viz. :—

For the best plough for light land:—First prize awarded to R. Hornsby & Sons; second ditto to Ransomes & Sims; third ditto to J. & F. Howard.

For the best plough for heavy land:—First prize awarded to R. Hornsby & Sons; second and third equally divided between Ransomes & Sims and J. & F. Howard.

GREAT PLOUGHING CONTEST AT STANLEY, PERTHSHIRE, confined exclusively to makers.—At the great competition of ploughs at Stanley on the 7th and 8th March, 1860, under the auspices of His Grace the Duke of Athole, K.T. President of the Highland Society of Scotland, R. H. & Sons had the honour to receive two prizes and one commendation, for their improved patent general purpose and light land ploughs, which were so successful at the Royal Agricultural Society's meeting at Warwick in July last.

The Warwick general purpose prize ploughs of Messrs. Howard, of Bedford, and Ransomes & Sims, of Ipswich, were amongst the competitors, and were worked by their champion ploughmen; but the superior position taken by R. H. & Sons will be seen from the fact that they were the **ONLY** English makers, *the whole of whose ploughs were selected for the second day's trial*, and each of which received an award.



R. HORNSBY AND SONS' PATENT DRILL FOR SMALL OCCUPATIONS.

PATENT DRILLS FOR SMALL OCCUPATIONS, to which the first prize of £5 was awarded by the Royal Agricultural Society of England, at its last trial at Salisbury; the first prize of £5 by the Bath and West of England Agricultural Society, at Plymouth; the first prize of £5 by the Royal Agricultural Society, at Carlisle; the

first prize of £5 by the Bath and West of England Society, at Tiverton.

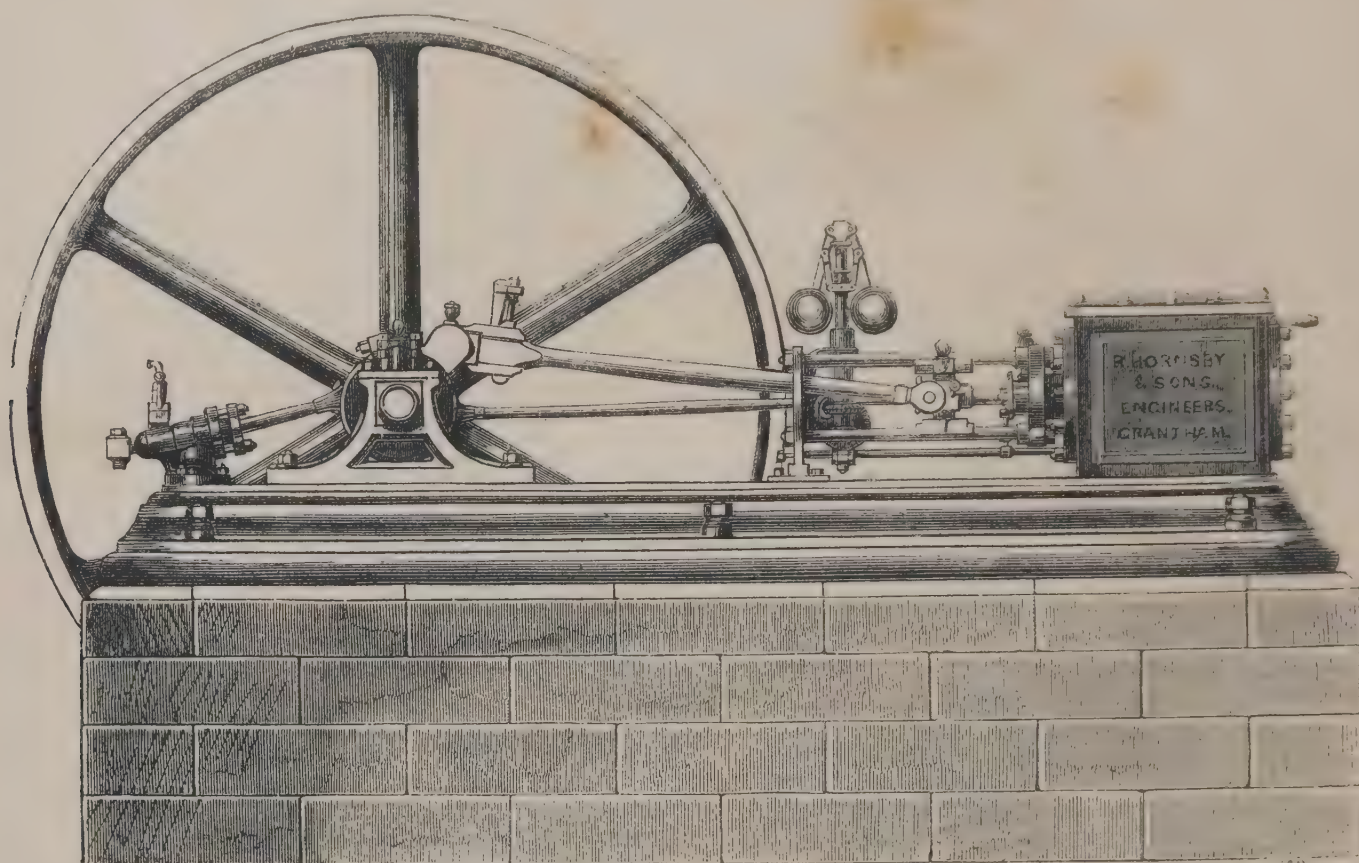
These drills combine most of the advantages of R. Hornsby & Sons' patent corn drills, for which so large a number of prizes have been awarded.

The patent india-rubber seed conductors are used instead

HORNSBY, RICHARD, & SONS, *continued.*

of tins, the advantages of which are now too well known to require further comment. They are fitted with iron levers, each acting independently: they will deposit any quantity or description of corn, and by simply changing

the cup barrel, are equally well adapted for drilling turnip, mangold wurtzel, or cole seed, at any required depth in the soil, or at any distance apart in the rows, from 6 in. and upwards, for the various crops of corn and seed.



R. HORNSBY AND SONS' IMPROVED FIXED STEAM ENGINE.

IMPROVED FIXED STEAM ENGINES, to which the prize of £10 was awarded at the last trial of the Royal Agricultural Society, at Chester.

This engine, the design and workmanship of which are mentioned in the report of the judges of the Royal Agricultural Society as being "very good," and the consumption of fuel as "low," is of the simplest and most serviceable character, and presents especial advantages to persons requiring such a power. It is made complete on a metal foundation plate, easy of removal, and supplied with cylindrical Cornish boiler, of suitable size and strength. The whole is made of the best materials, and executed in a superior style of workmanship; all complete to the end of fly wheel shaft, exclusive of carriage, masonry, and brick-work.

By Her Majesty's royal letters patent—R. HORNSBY & SONS' IMPROVED PATENT WASHING, WRINGING, AND MANGLING MACHINES.

R. Hornsby & Sons having for some time been satisfied that a really simple and effective washing machine was amongst the first domestic wants of the community, have devoted considerable attention to the subject, and have at length succeeded in perfecting a machine which they can unhesitatingly assert to be the best and most efficient, to wash thoroughly, quickly, without injury to the linen, with the least possible quantity of water, and at the least cost for fuel.

The following is a brief description of the principle and action of the machine:—

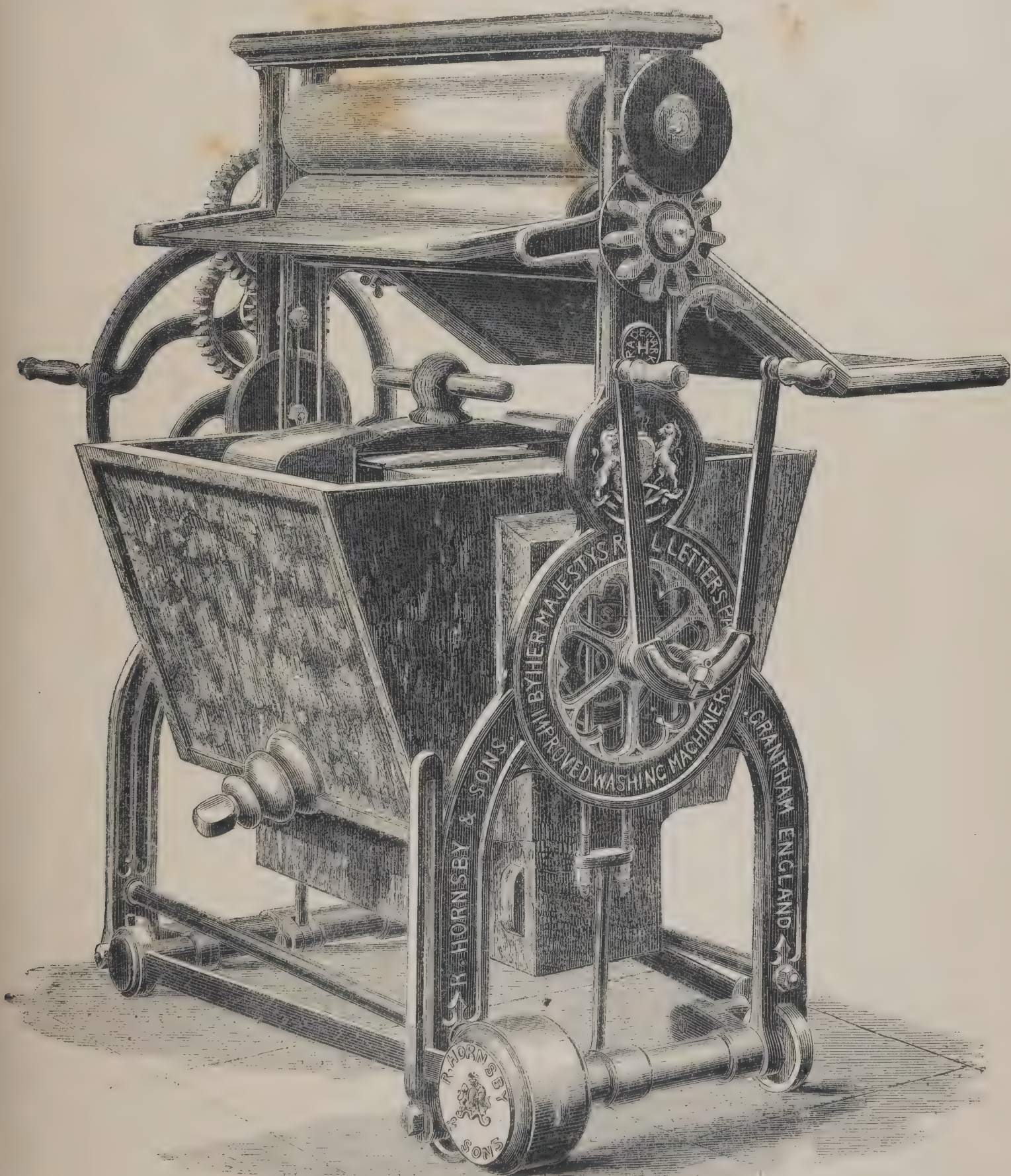
This washing machine, which may be fitted either with or without the wringing and mangling apparatus, consists of a tub or vessel, of well-seasoned wood, and first-class workmanship, the inside of which is covered with ribs, and at the bottom of which is a patented hollow bridge.

The clothes, soap, and water are prepared in the usual way, and when the vessel is charged it is swung backwards and forwards in such a manner as to bring the top quite perpendicular at every movement. By the action some of the air and water rush to and fro between the spaces of the bridge, and inflate or spread the clothes which are also rubbed against the bridge by the water pressing over and through them; the process being similar to that of hand-washing, viz. rubbing the clothes both in and out of the water, submerging them, and by a sort of syringing action, removing every particle of dirt. On opening the vessel, the clothes are never found either rolled into a mass or swimming on the surface, but always thoroughly opened to the action of the water, which passes through the fabric of the clothes. The water is used as hot as possible, and as the tight lid confines the steam the clothes are subject to a thorough boiling and steaming during the washing operation. The machine is well got up, is very compact and portable, as well as convenient to use, and easy to work.

These machines have been severely tested for a length of time, both at hotels and in private families, and the results are such as to warrant R. H. & Sons in saying that nothing of more general utility has for a long time been brought before the public. The beautiful cleanliness and improved appearance of the linen when washed by them—the quickness with which a large and heavy wash can be got through without discomfort or annoyance—the great saving in the fire required—and the fact that articles which the most careful hand-washing would injure are washed with perfect safety, and that clothes of every kind receive no damage in the process—are sufficient evidence that their machine supplies the long-wanted desideratum, and must be adopted by almost every class.

The principal advantages of R. H. & Sons' washing machine may be briefly summed up as follows:—

HORNSBY, RICHARD, & SONS, *continued.*



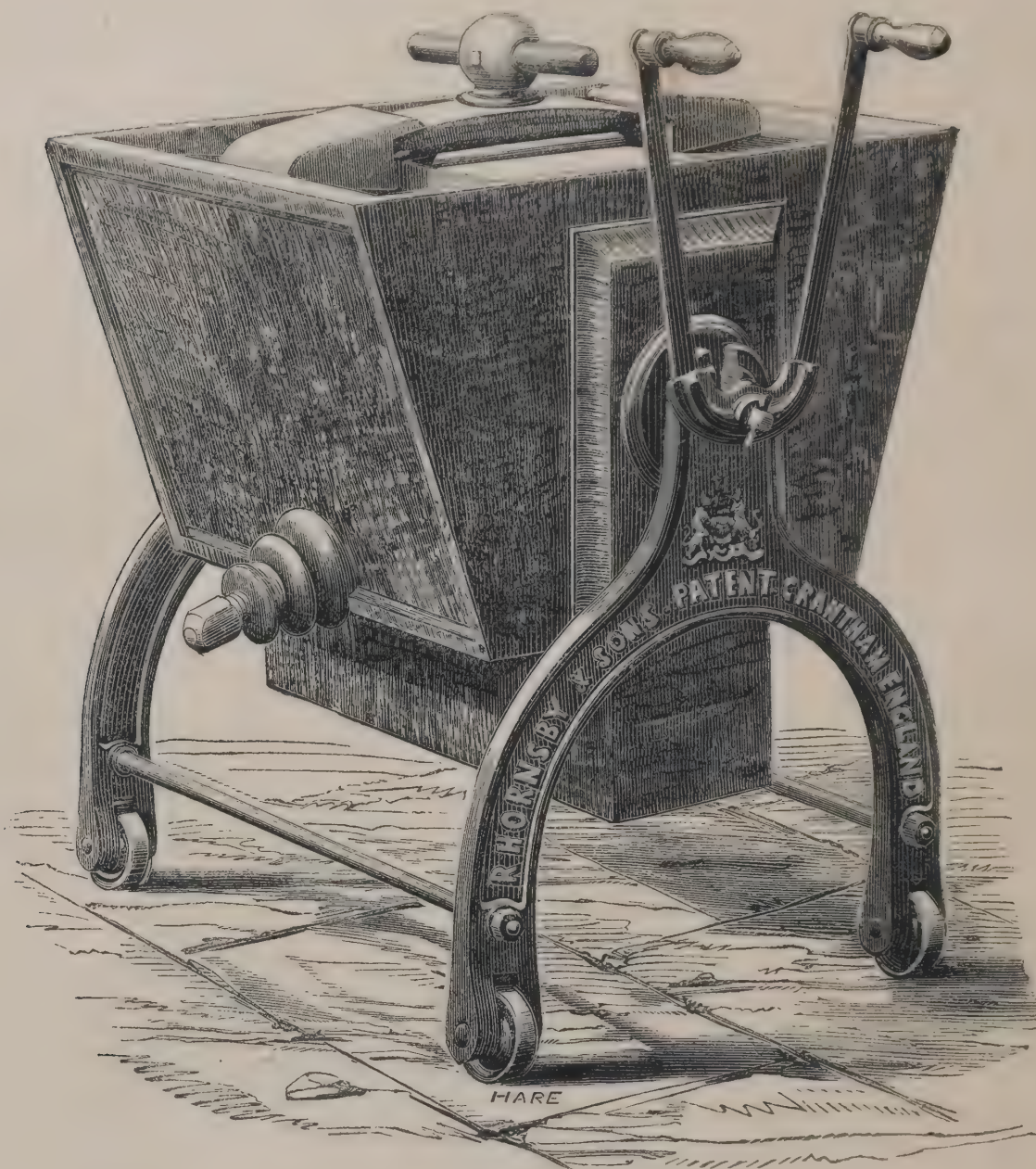
R. HORNSBY AND SONS' IMPROVED PATENT WASHING, WRINGING, AND MANGLING MACHINE.

1st. *It is thoroughly effective and perfect in operation.* The machine is really what it professes to be, and not a mere vessel in which the linen is swum, and therefore scarcely washed at all. This efficiency is attained by the improved form of the tub or vessel—the construction of their patent hollow bridge, as before described—and by their PATENT DOUBLE HANDLE, by which the Machine is worked. This handle—which will be seen in the en-

graving—gives TWICE THE MOTION to the Machine that is obtained in any other, and produces so violent a cleansing action, that the linen is thoroughly washed in an incredibly short time, without hand-rubbing.

2d. *It is simple,* containing nothing that can by any possibility injure the most delicate article—requires no management, and is easily worked.

3d. *It is compact in arrangement,* occupying less

HORNSBY, RICHARD, & SONS, *continued.*

R. HORNSBY AND SONS' IMPROVED PATENT WASHING MACHINE.

room than any other—having the washing vessel placed immediately under the rollers, so that the water, in wringing, falls directly into it, and large articles are drawn out and wrung without labour in lifting from the vessel to the rollers.

4th. *It is fitted with an improved tub*, to be used in blueing or rinsing, which offers many advantages over similar appliances offered to the public. When performing either of the above operations, the lid of the washing vessel is removed, and this tub fitted in its place under the rollers, to receive the blue or rinsing water, which can then be taken away without interfering with the other portion of the machine. It is of sufficient size to answer every purpose; does not form part of or lessen the size of the washing vessel; will be found useful for a variety of domestic purposes; and is included in the price of the machine.

5th. *It is fitted with an improved patent lid*, which prevents leakage when in motion, and confining the air, steam, and water, gives them a full and very important action on the clothes.

6th. *It is remarkably easy to work*, having their improved patent pendulous motion, by which the tub is swung from side to side in working with the least amount of power. The patent balance box underneath the tub is

partly filled with sand, and assists the motion, causing the machine to be readily worked by any ordinary domestic servant.

7th. *It is of first-class material and workmanship*; every portion of both wood and iron work is as good as can be made; the rollers are well-seasoned sycamore or beech, brass-capped; and every part is finished with due regard to strength and durability.

BY ITS USE the whole of the washing of any family may be done *without inconvenience*, in an exceedingly short space of time, *without extra assistance*. A GREAT SAVING in fuel and in soap will be effected. The linen will be greatly improved by the bleaching action of the machine, and will wear much longer than when subjected to the destructive friction of hand-rubbing. When the combined machine is used, the wear of the clothes will also be enhanced by the wringing being effected without the usual injury to the fabric; and the entire performance will be such as to render it *an essential* in every well-regulated and economically managed family.

R. Hornsby and Sons have a large number of testimonials as to the efficiency of their washing, wringing, and mangling machines, but space will only allow of the publication of the following. They will be happy to furnish any number on application.

HORNSBY, RICHARD, & SONS, *continued.*

*"Haggerstone, Beal, Northumberland,
Nov. 23, 1861.*

"GENTLEMEN,

"I HAVE very great pleasure in bearing testimony to the efficient manner in which the washing, wringing, and mangling machine does its work, which I ordered from you when at the Royal Agricultural Society's Show, held at Leeds in July last. I consider it a very great saving of time, labour, fuel, &c. when compared with hand-washing, as we generally wash once in four weeks, which took two women two days; on each time now, since using the machine, the whole of the operation is completed in about eight hours; the clothes are equally well washed; the wringing is much better done, and not so much injured as in twisting by the hand; the mangling is beautifully done; indeed, the linen altogether has a beautiful clean appearance when finished by the machine.

"The machine itself is a compact and convenient piece of workmanship, and occupies very little room in the wash-house.

"The short experience that I have had of the machine, I would not now be without one—as you know I did not receive it until October last.

"I am, sirs, yours truly,
"J. MAIN."

"MRS. HOPPER has great pleasure in testifying to the simplicity and efficiency of the washing and wringing machine manufactured by Messrs. Hornsby & Sons. The linen washed by means of it, is done in much less time, with a great saving of labour and fuel, and with comparatively little, if any, injury arising from the process. The appearance of the linen, too, is very much improved, as compared with what can be attained when the washing is done by hand, or by the numerous imperfect washing, wringing, and mangling machines hitherto in use. For heavy articles, such as blankets, counterpanes, &c. this machine is indispensable. From her own experience, no less than from that of her friends, Mrs. H. can testify that no previous machine, whether in respect to compactness, convenience, or general efficiency, has given such unqualified satisfaction as Messrs. Hornsby's.

*"Houghton-le-Spring, Durham,
"Nov. 25, 1861."*

"Barnsley, Nov. 25, 1861.

"GENTLEMEN,—Having received your machine a short time ago at my residence, I can testify to its worth. As a washing, wringing, and mangling machine, it is superior to anything I ever saw or used; and the saving of time, labour, and expense is truly wonderful.

"I am, gentlemen, yours, &c.
"JOHN GREEN, *Agent.*

"Be kind enough to send a few prospectuses as soon as convenient, and I can then obtain an order for a larger machine—one to wash, wring, and mangle."

"Terrington, Nov. 25, 1861.

"DEAR SIR,—I have great pleasure in recommending the machine supplied by R. Hornsby & Sons, as an efficient washer, wringer, and mangler; saving a great deal of time and labour, when compared with the original method of washing by the hand.

"Yours truly,
"MATTHEW JOHNSON."

*"Agricultural Implement Works,
Gloucester, Nov. 26, 1861.*

"GENTLEMEN,—I am glad to acquaint you that your new patent washing machine I purchased of you at Leeds Show, works to my entire satisfaction, as I find that one woman can thoroughly wash as many clothes in four hours, with your patent machine, that used to take two women nearly two days to do, and with less than half the soap, and without the least damage to the finest material;

and I am sure they only require to be known, and you will have a great demand for them. I would not be without one if they were double the price.

"I am, gentlemen, your obedient servant,
"WILLIAM SNOWDEN."

"Blows Hall, Ripon, Nov. 25, 1861.

"GENTLEMEN,—The washing, &c. machine, which you supplied, fully answers our expectations. The saving of time, fuel, and labour, is great; and owing to its simplicity, it may be put into the hands of any one using reasonable care.

"I am, gentlemen, yours truly,
"WILLIAM HARLAND, Jun."

*"To MR. E. HEADLY,
Corn Exchange Street, Cambridge.*

"SIR,—As you wish to know how I like the Hornsbys' patent washing machine, which I had of you, I must say I very much approve of it. It makes the linen a beautiful colour, and, by what I have seen, I believe it will not injure the linen so much as washing by hand. I can get it done in half the time, and would not be without it for double its value.

"Yours respectfully,
"E. WINTERS."

"Chesterton, Cambs. Nov. 2, '61."

"Melton Mowbray, Nov. 23, 1861.

"GENTLEMEN,—Each and every washing machine I have sold, I am pleased to say, fully answers your representations. I am informed by one of the purchasers he had a good deal of prejudice to overcome with his servants, that, after a trial of some months, experience has proved it to possess great advantages in saving of time and labour. The wringing and mangling having a compound leverage, any amount of pressure can be attained without risk of breakage; the wood-work is carefully put together, and well seasoned—a very important advantage in such articles. As a whole, it is a valuable article, and well worthy the attention of parties who have any amount of washing to get through.

"I am, gentlemen, yours respectfully,
"WARREN SHARMAN."

*"Albion Foundry, Pitts' Lane, Mill Street,
Kidderminster, Nov. 19, 1861.*

"GENTLEMEN,—The washing machine I had from you is the best I have seen for economy and simplicity; its saving in labour is quite 50 per cent.; also the same amount in fuel and soap—three important items. Since we have had it, we have done without the assistance of a washerwoman—another important saving, as all our washing for 9 individuals is done by our ordinary servant girl. I am sure all persons not using them sacrifice a great amount every year.

"I am, gentlemen, yours respectfully,
"JOHN TURTON."

"King's Lynn, Nov. 20, 1861.

"GENTLEMEN,—I beg to inform you that my family have used the washing machine I had of you these last three months, and like it remarkably well; I cannot speak too highly of it. I lent it to a friend of mine; they also will not wash any more without one. Please to send me one, price £8 8s. as soon as possible.

"I think no family would be without one if they did only know the use of such valuable machines—both saving time, fuel, and a great deal less injury to the clothes than hand-washing. In fact, our washing was done at less than half the usual expense, and in one-quarter the time.

"Believe me, yours most respectfully,
"FREDERICK SAVAGE."

HORNSBY, RICHARD, & SONS, *continued.*

*"Swan Lane, Upper Thames Street,
London, Nov. 20, 1861.*

"DEAR SIRS,—Respecting the efficacy of your washing machines, I would state the one we (Carter & Co.) ordered at the Leeds Show, I sent to my own residence, and having had the opportunity of trying a great number of them before the public, I can with confidence state it is decidedly the best, as it both does a larger amount of work with less labour, and most effectually cleans the linen without in any way injuring it.

"I am, dear sirs, yours truly,
"C. CARTER."

*"Brent House, near South Shields,
Nov. 26, 1861.*

"GENTLEMEN,—I beg to say that the washing machine (size R.) which you have sent me has given great satisfaction; it is an exceedingly well constructed and powerful implement, and is found to facilitate the labour of washing very much; the quantity of clothes which previously required a long day to wash, is now done in a few hours by your machine. The mangling apparatus is also very effective.

"I am, gentlemen, yours obediently,
"WM. ANDERSON."

*"Polbathic, Cornwall,
Nov. 28, 1861.*

"GENTLEMEN,—The two washing machines I had from you answer remarkably well; one I have sold, the other (seeing its value) we have kept for ourselves. The machine possesses advantages over several others I have seen. 1st.—It is so remarkably simple, that any person, in two or three minutes, can understand its working. 2d.—It is very easy to work. A boy or girl, of 12 or 15 years of age, could work it all day. 3d.—It washes very clean, without the least injury to the clothes, however fine or delicate. 4th.—The wringing and mangling process is certainly complete. The peculiar, though simple, way in which the levers are brought to bear on the rollers, I should think, will never be surpassed.

"I herewith forward you two testimonials which I have received, and expect to give you an order for two more machines very shortly.

"I am, yours respectfully,
"WM. BRENTON."

"November 21st, 1861.

"SIR,—The machine I had from you far exceeds anything I expected; I have given it a fair trial, and am convinced that a woman and a girl will perform as much work as six good washerwomen. I can now do my washing with one-third of soap and fuel I formerly used. I think the machine complete.

"MR. W. BRENTON." "Yours respectfully,
"J. PARKER."

"Trebole Farm, St. Germans.

"THE washing machine I had from you on trial last washed remarkably well. It certainly effected a considerable saving of soap, fuel, and labour. The washing was well done, and the wringing and mangling process is excellent.

"MR. BRENTON." "Yours, &c.
"S. P. PAIGE."

"Hanley, Staffordshire, Dec. 12, 1861.

"DEAR MADAM,—The washing, wringing, and mangling machine (R.) with which you supplied me, gives every satisfaction.

"Its simplicity of construction, superior workmanship, immense saving of time and labour, the ease with which it is worked, and the small space occupied, make it the most convenient and efficient machine I have ever seen, and I can strongly recommend it to those who have not

already availed themselves of the assistance of so valuable a machine.

"Believe me, madam, yours truly,
"To MRS. T. MELLARD,
Agricultural Implement Depôt,
Uttoxeter."

"Mail Hotel, Grantham, Dec. 3, 1861.

"GENTLEMEN,—The washing machine I had from you for use at this hotel has now been in operation for some time, and I have great pleasure in bearing my gratified testimony to its thorough efficiency and value.

"Our large wash, which has hitherto had to be got through with great inconvenience by the ordinary mode of hand-rubbing, is now accomplished by the machine, with an immense saving of time, labour, fuel, &c.; and so perfectly satisfied am I of the advantage I derive from it, that I cannot speak too highly of it, and would not be without it on any consideration.

"No hand-rubbing can produce such clean and beautifully-bleached linen as is obtained by the simple action of the machine. It will wash clothes of any description without the slightest injury—but with a great saving to the fabric; it is of first-rate workmanship, very compact and convenient, easy to work, and can be managed by any one, and the wringing and mangling rollers with which it is fitted, are the very perfection of their kind. The tub for blueing or rinsing which you send with it is also very valuable, and in fact my only wonder is that any one can continue to do their washing without the use of a similar machine.

"I have tried many machines, but have found none to equal it, and it will afford me great pleasure to answer any inquiries, or to bear any testimony to its value.

"I am, gentlemen, yours truly,
"MARY TURGOOSE."

*"Croft House, Marsh, near Huddersfield,
Nov. 30, 1861.*

"GENTLEMEN,—I have much pleasure in bearing my testimony to the general usefulness of your washing, wringing, and mangling machine. My servants inform me that by using it the saving of time and labour is *very considerable*, and that it effectually washes the linen without the slightest injury to the lightest fabric. It is the most compact and convenient machine of the kind I know of, and the workmanship is thoroughly good. I can recommend it with every confidence.

"Yours very truly,
"DAVID SYKES."

In concluding this notice of the principal manufactures exhibited by them at the International Exhibition, R. Hornsby & Sons desire to draw the attention of the many home, foreign, and colonial agriculturists and merchants who may inspect their machinery and implements, to the high position taken by them during many years, and to the extraordinary facilities they possess for the supply of every description of first-rate goods, that may be required for any part of the world. They refer with confidence to the successful introduction of their manufactures into France, the Austrian dominions, Hungary, Spain, Russia, Sweden, Australia, New Zealand, South America, Canada, and almost every quarter of the globe, and beg to assure those who may favor them with inquiries or orders they are prepared and determined to spare no efforts to keep their implements in advance of all competition.

Illustrated catalogues, containing prices, drawings, and full particulars, may be had at their stand in the Exhibition, or by application to

RICHARD HORNSBY & SONS,
Spittlegate Iron Works,
Grantham, Lincolnshire,
England.

[2135]

HUNT & PICKERING, *Goulding Works, Leicester*.—Corn crusher mills, root pulpers, oil cake breakers, ploughs, rakes, whippetrees, &c. (See pages 64 and 65.)

[2136]

HUNT, T. R. & R., *Earls Colne, Essex*.—Steam-power machine for hulling clover and trefoil seed.

[2137]

HUNTER, PHILIP, 64 *Nicolson Street, Edinburgh*.—Latest improved churns, dairy utensils, ornamented Scotch cooper work, &c.

CHURNS AND DAIRY UTENSILS.

PHILIP HUNTER'S registered PRIZE CHURN is unrivalled in simplicity, durability, and cheapness. Having bestowed the greatest portion of his time during the last 25 years to the consideration of the construction of churns, the exhibitor can state with confidence that his churn

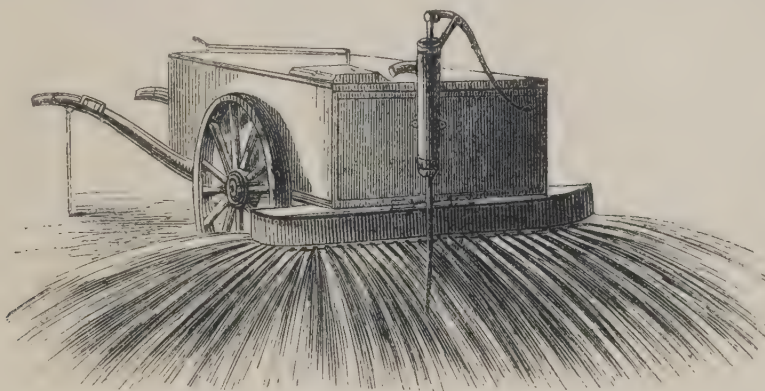
possesses advantages over any other at present in use.

He exhibits the following articles of Scotch carved wood and cooper's work:—

Luggies, quaighs, table whiskey casks, punch-bowls, toddy ladles, trenchers, butter coolers, &c.

[2138]

JAMES, ISAAC, *Tivoli, Cheltenham*.—Liquid manure distributor and pump.



LIQUID MANURE DISTRIBUTOR.

This apparatus has obtained no fewer than 17 prizes at the shows of various agricultural societies. It possesses the very great advantage of incapacity of derangement.

It can be applied with equal facility to the distribution of liquid manure, to irrigation, and all similar purposes.

[2139]

KAY, THOMAS, *Holbeck Moor Pottery, near Leeds*.—Horticultural pots, garden pots, fern cases, bordering for garden walks.

[2140]

KEMP, MURRAY, & NICHOLSON, *Stirling, N.B.*—Combined reaper and mower; 2-horse self-cleaning grubber.

KEMP, MURRAY, & NICHOLSON'S COMBINED REAPING AND MOWING MACHINE is unsurpassed for simplicity, efficiency, and durability, and has been awarded a prize at all the places where it has been in competition, including the highest award of the Highland and Agricultural Society of Scotland, for 1861. Catalogues containing full description and numerous testimonials to be had free on application.

Combined reaping and mowing machine.	£24	0
Machine for reaping only	23	0
Either of the above with shafts extra	1	0

KEMP, MURRAY, & NICHOLSON'S TENNANT'S SELF-CLEANING 2-HORSE GRUBBER (or cultivator), is the best implement now in use for cleaning and pulverising the soil, and the highest commendations have been awarded it by numerous extensive agriculturists. It can be readily taken to pieces and packed into small compass, thus rendering it peculiarly adapted for export. Price,

With 2 wheels	£5	5
With 1 wheel	5	0

[2141]

KENNAN & SONS, *Dublin*.—Improved iron fences and erecting tools, log saws, lawn mowers, and root blasters. (See page 66.)

[2142]

KINGSTON, SAMUEL, *Spalding*.—Rotary cupola beehive on Nutt's principle.

[2143]

LEACH, GEORGE, *Leeds*.—Models of patent steam mole for cultivating land, or pulverising the soil.

CLASS IX.—*Agricultural and Horticultural Machines and Implements.*

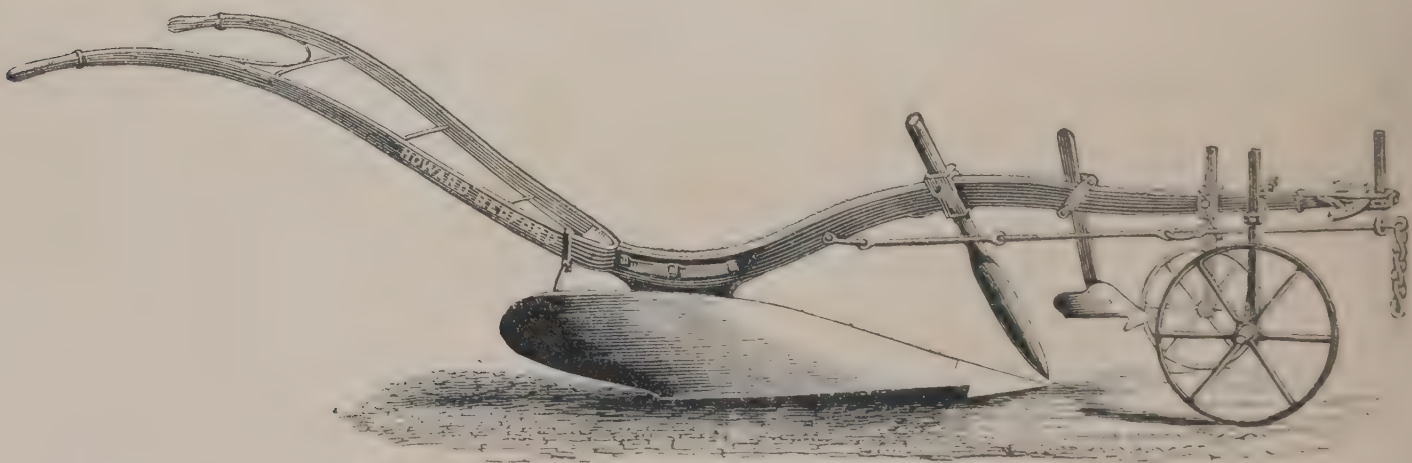
HOWARD, JAMES & FREDERICK, *Britannia Iron Works, Bedford.*—Steam ploughs, steam cultivators, ploughs, harrows, horse rakes, haymaking machines.

Thirty-five First Prizes have been awarded to James and Frederick Howard by the Royal Agricultural Society of England; also the Prize Medal at the Great Exhibition of all Nations in 1851, the gold Medal of Honour at the Paris Exhibition in 1855, and the gold Medal of Honour at the Vienna Exhibition in 1857.



HOWARD'S PATENT STEAM PLOUGHING AND CULTIVATING APPARATUS.

- | | |
|---|---|
| <p>1. HOWARD'S PATENT STEAM CULTIVATING APPARATUS, consisting of engine, windlass, wire-rope, cultivator, anchors, pulleys, &c. complete.</p> | <p>2. HOWARD'S PATENT PLOUGH for steam-power.
3. HOWARD'S PATENT CULTIVATOR for steam-power.
4. HOWARD'S PATENT HARROW for steam-power.</p> |
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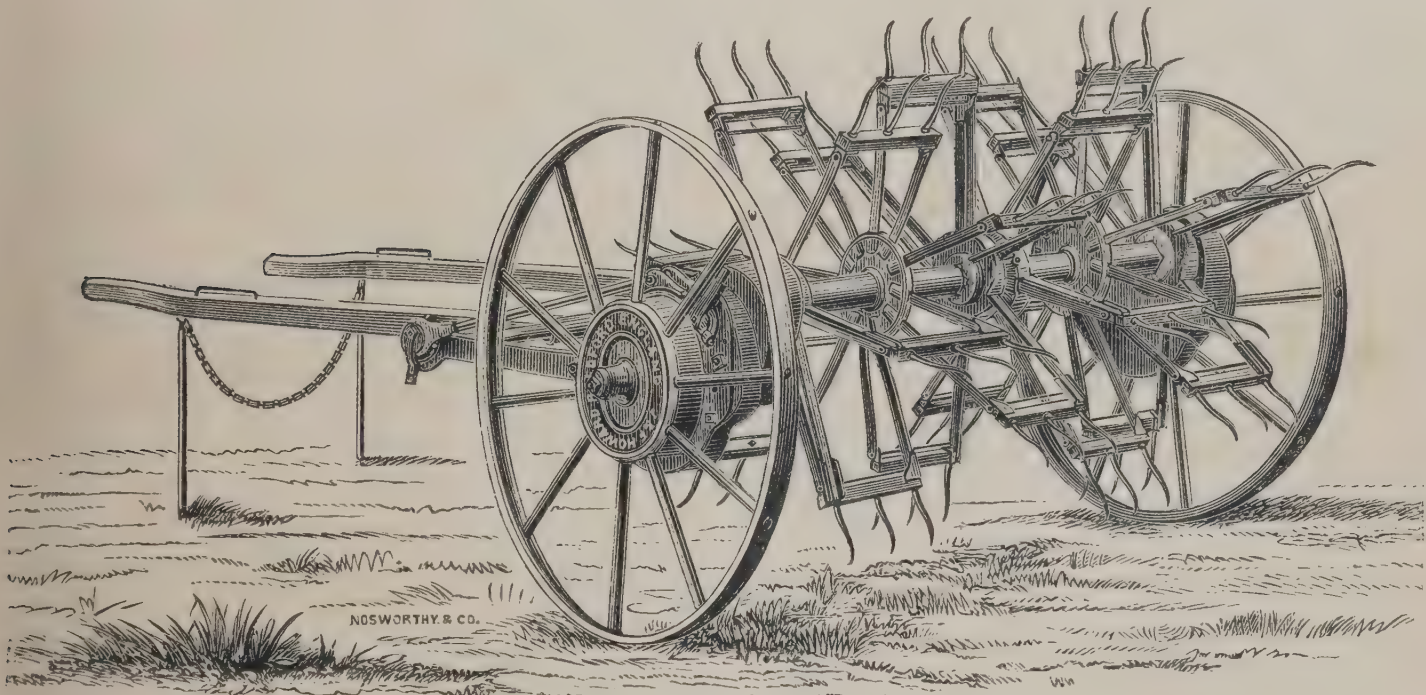


HOWARD'S PATENT CHAMPION PLOUGH.

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| <p>5. HOWARD'S PATENT 4-HORSE WHEEL PLOUGH.
6. HOWARD'S PATENT 3-HORSE WHEEL PLOUGH.
7. HOWARD'S PATENT 2-HORSE WHEEL PLOUGH.
8. HOWARD'S PATENT 2-HORSE SWING PLOUGH.
9. HOWARD'S PATENT 1-HORSE WHEEL PLOUGH.</p> | <p>10. HOWARD'S PATENT DWARF OR PONY PLOUGH.
11. HOWARD'S PATENT POTATO-DIGGING PLOUGH.
12. HOWARD'S PATENT SUBSOIL PLOUGH.
13. HOWARD'S PATENT RIDGING PLOUGH.
14. HOWARD'S PATENT 4-HORSE HARROWS.</p> |
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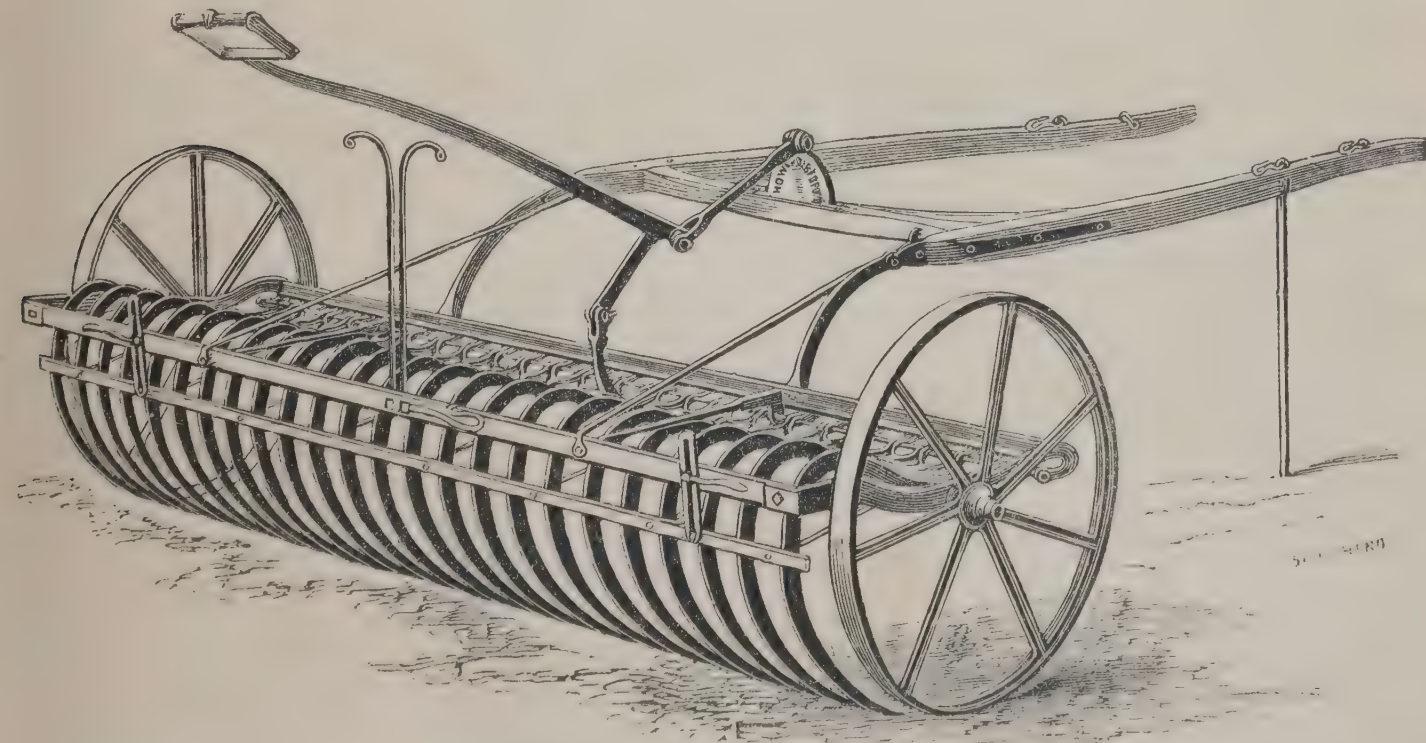
HOWARD, JAMES & FREDERICK, *continued.*

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| 15. HOWARD'S PATENT 3-HORSE HARROWS. | 20. HOWARD'S IMPROVED 4-HORSE TUBULAR IRON WHIPPLETREES |
| 16. HOWARD'S PATENT 3-HORSE JOINTED HARROWS. | 21. HOWARD'S IMPROVED 3-HORSE TUBULAR IRON WHIPPLETREES. |
| 17. HOWARD'S PATENT 2-HORSE HARROWS. | 22. HOWARD'S IMPROVED 2-HORSE TUBULAR IRON WHIPPLETREES. |
| 18. HOWARD'S PATENT 2-HORSE JOINTED HARROWS. | |
| 19. HOWARD'S PATENT 1-HORSE HARROWS. | |



HOWARD'S PATENT HAYMAKING MACHINE.

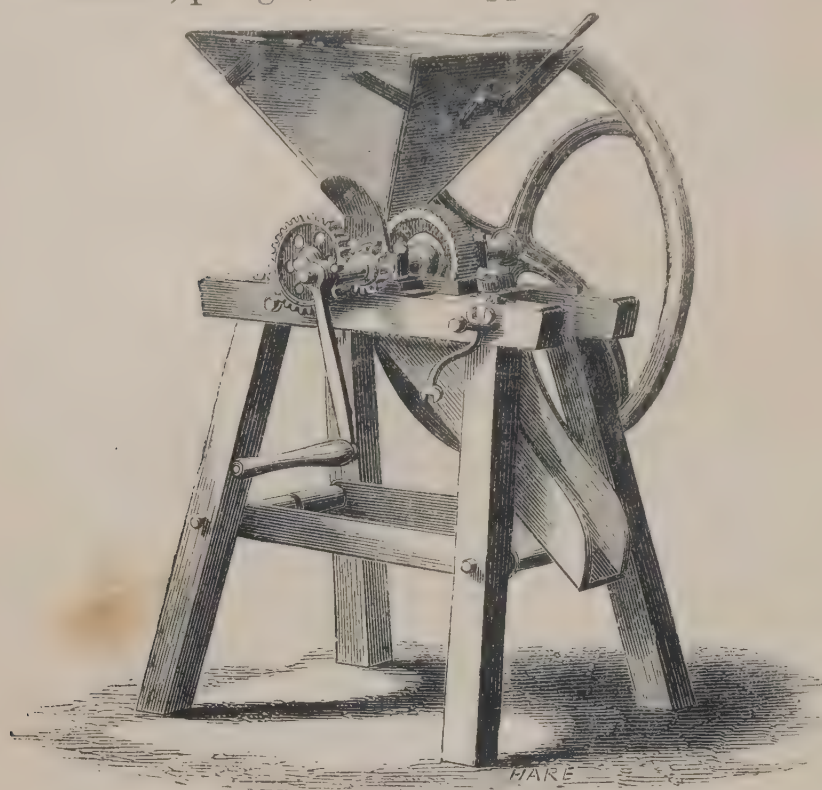
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| 23. HOWARD'S PATENT 2-HORSE HAYMAKING MACHINE. | 24. HOWARD'S PATENT 1-HORSE HAYMAKING MACHINE. |
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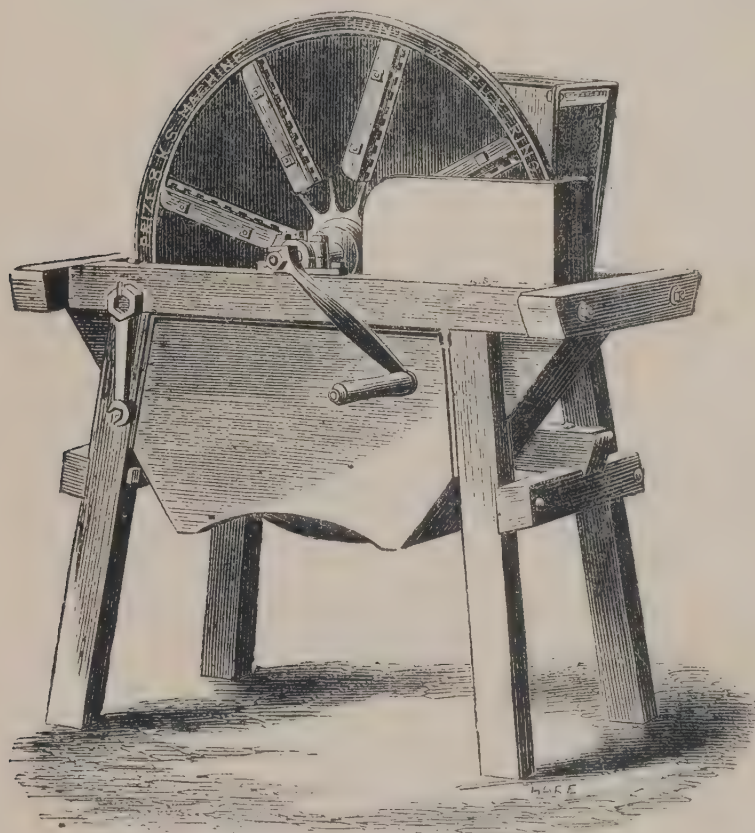
HOWARD'S PATENT HORSE RAKE.

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|---|--|
| 25. HOWARD'S PATENT HORSE RAKE, large size. | Full particulars of the above, and other implements manufactured by JAMES & FREDERICK HOWARD, Britannia Iron Works, Bedford, may be had free on application. |
| 26. HOWARD'S PATENT HORSE RAKE, middle size. | |
| 27. HOWARD'S PATENT HORSE RAKE, small size. | |
| 28. HOWARD'S DYNAMOMETER, for testing the draught of ploughs, &c. | |

HUNT & PICKERING, *Goulding Works, Leicester.*—Corn crusher mills, root pulpers, oil cake breakers, ploughs, rakes, whippetrees, &c.



CORN CRUSHER.



DISC ROOT PULPER.

3. An improved oil-cake breaker, for breaking oil cake in pieces for feeding beasts, sheep, lambs, calves, &c. Is so arranged that it can be instantly set to any of 9 different gauges, without altering the depth of gearing; has movable hopper for pieces, and screens the dust in falling.

No. 3, for one man, with wood hopper .	£3	5	0
No. 4, „ „ iron „ .	3	10	0
No. 5, „ „ „ „ for cotton cake	3	12	6

Size exhibited No. 4.

1. An improved corn crusher or kibbling mill, for crushing beans, peas, oats, barley, Indian corn, wheat, &c. Two solid steel rollers with fluted surfaces are made to pass each other at different velocities, by which the corn is crushed with little power, and to any required size.

They are made in the following order :—

No. 3, for one man, will crush per hour (making 50 revolutions per minute), 2 bushels of beans, 7 pecks of oats.

Price £4 7 6

No. 4, for two men, will crush per hour (making 50 revolutions per minute), 5 bushels of beans, 3 bushels of oats.

Price £5 5 0

No. 5, for power only, will crush per hour (100 revolutions per minute), 22 bushels of beans, 12 bushels of oats.

Price £7 0 0

No. 5 B, as No. 5, but mounted in brass and highly finished. Price . £8 8 0

Size exhibited No. 4.

2. An improved disc root pulper, for reducing roots to a pulp for feeding cattle, possesses the following points—

1st. Strength, with efficiency and simplicity, no gearing or wheels required.

2d. Can be set to produce any size pulp.

3d. The cast-steel knives are removable, to allow of sharpening, &c.

4th. Requires less power than any pulper publicly tested.

5th. Prices moderate.

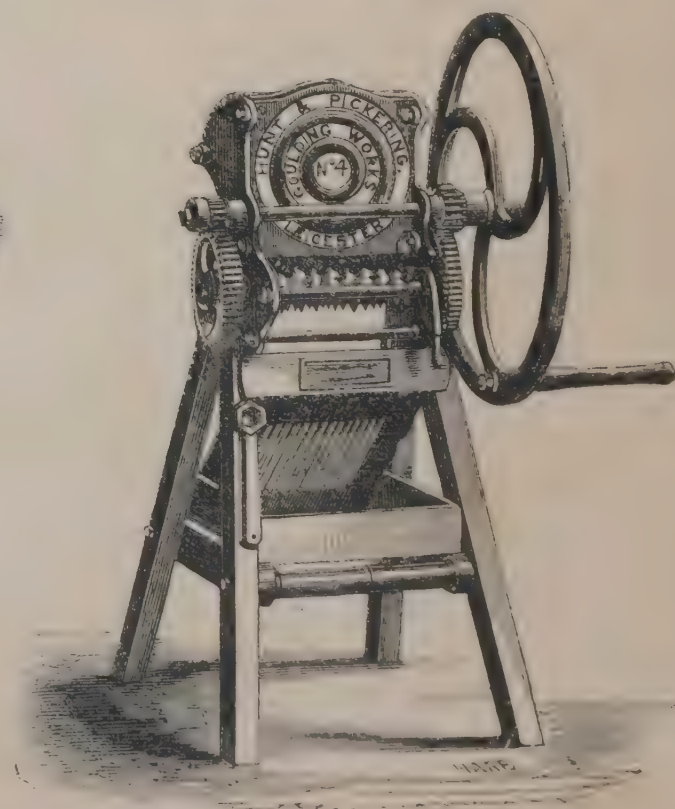
No. 6 KS, for one man, will pulp 8 cwt. per hour. Price £4 10 0

No. 8 KS, for two men, or power, 12 cwt. per hour. Price £5 5 0

No. 12 KS, for two men, or power, 1½ to 4 tons per hour. Price £6 0 0

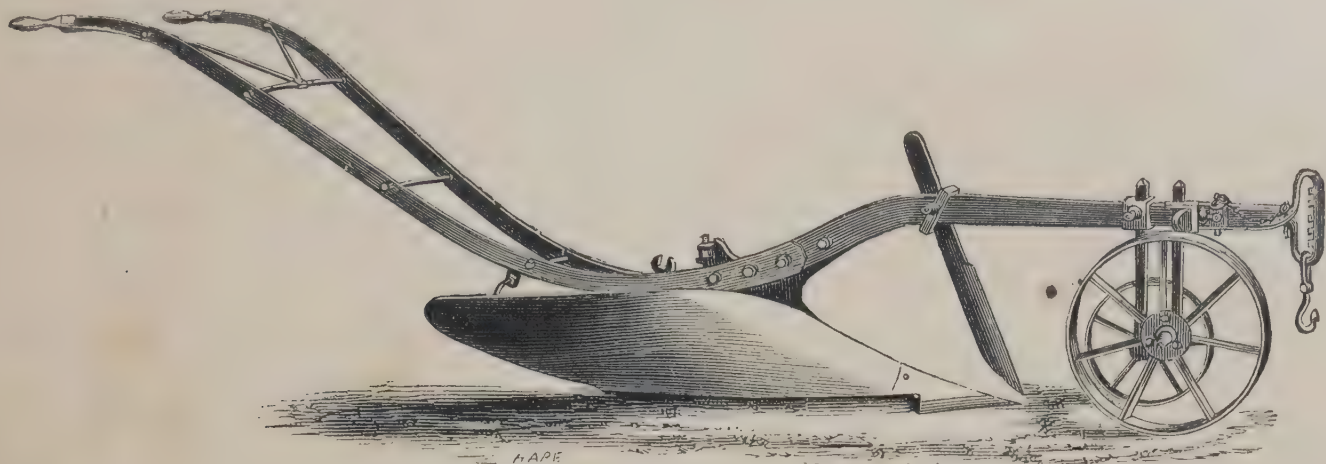
Pulleys extra according to size.

Size exhibited No. 8 KS.



OIL-CAKE BREAKER.

HUNT & PICKERING, *continued.*



PATENT IRON PLOUGH.

4. A patent iron plough, possessing many important improvements, being the result of a quarter of a century's practical experience in plough manufacture.

- 1st. Every part is readily accessible and simple.
- 2d. Proportionate strength is obtained throughout, without any obstructions upon the beam.
- 3d. A new and novel mode of pitching the share.
- 4th. Every movement is given to the wheels, by two screws and clips.
- 5th. The patent oil box wheels exclude grit and retain the oil.
- 6th. The coulter is *straight* and readily sharpened, every required movement being given by a novel adaptation of the circular wedge.

W. H. A. Light land plough with 2 wheels.

Price	£4 5 0
Extra for steel furrow turner	0 6 0
Ditto patent wheels	0 5 0
W. H. B. General purpose plough	4 10 0
Extra for steel furrow turner	0 7 6
Ditto patent wheels	0 5 0

Plough exhibited is W. H. B.

5. A pair of Russell's patent oil box plough wheels, by which the grit is entirely excluded from the axle, and the oil retained; a valuable addition to the plough.

Price, land wheel, 4s. furrow wheel, 6s. 6d. complete with axles.

A section is also exhibited showing the construction.



IRON SACK BARROW.

6. A set of improved link whippetrees, so arranged that the strain is equally divided throughout, enabling them to bear double the resistance of the ordinary whippetree. Price, per set of 3 . . . 12s. 6d.

7. An improved couch-grass or twitch rake. A simple arrangement by which great strength is obtained, without much weight; is readily repaired with new teeth, and may be said to be everlasting. The teeth are of solid steel. Price, Without handles 3s. 0d. Handled . . . 3 6

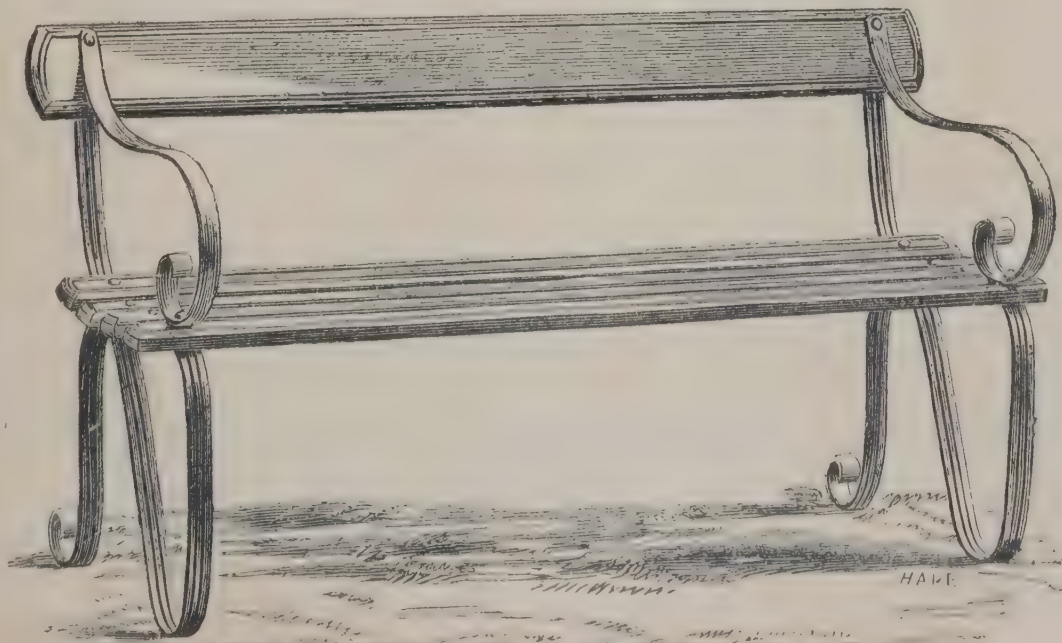
8. An improved iron sack barrow, in which both axle and wheels revolve independent of each other, enabling them to be turned upon a barn floor without injury.

No. 3, general size, 12s. 6d.

No. 4, large size 13s. 6d.

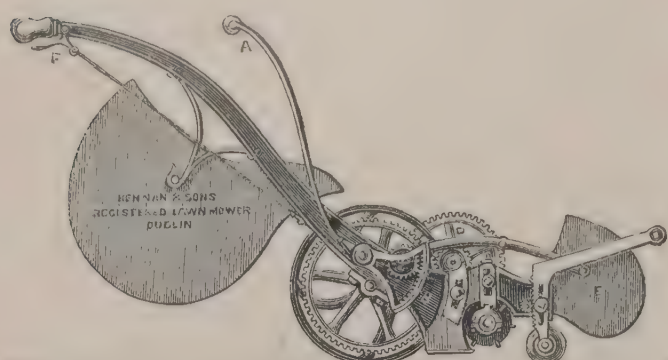
9. A Leicester garden seat; composed entirely of wrought iron and wood. The ends or supports are made from one piece of iron curved to the required shape, on which are bolted the back and seat which are of wood, thus forming one of the most simple seats ever produced. Each seat is finished equal to coach painting.

Prices from 18s. upwards.



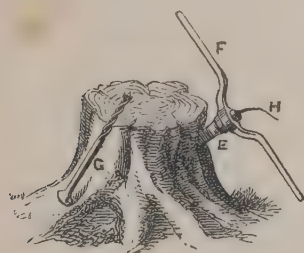
LEICESTER GARDEN SEAT.

KENNAN & SONS, *Dublin*.—Improved iron fences and erecting tools, log saws, lawn mowers, root blasters.



KENNAN'S LAWN MOWERS, with registered tilt gear.

When the box *E* has been filled with cut grass, it is raised and emptied into the large box at the back of the machine by simply depressing the handle *A*, which moves the segment *B*, gearing into the pinion *C*, and so raises the arm *D*, upon which the front box *E* is hung. The large grass carrier can be quickly over-set or lifted off the machine.



KENNAN'S APPARATUS FOR BLASTING ROOTS AND STUMPS OF TREES. The set includes perforated screw plug bent lever handle suitable screw auger, and a mould for cartridges.

This presents the simplest, most economical and efficient mode of breaking up roots or stumps of trees, so as to facilitate their removal or conversion into fuel. With 5 ounces of blasting powder, a large root may be split in about 8 minutes.

The apparatus complete in case with fuze for 50 roots, price £2 10

KENNAN'S IMPROVED TOOLS for erecting wire fences, strainer, knotting tools, collar vice, and straightening machine, in case complete. Price £3 10

KENNAN'S PORTABLE JOINTED LADDER, for house and garden use.

REGISTERED STANDARD FOR WIRE FENCES, made of a single piece of iron Π section, is fixed without wood or stone blocks.

REGISTERED TANGENTIAL WINDERS, for straining wire fences on iron posts.



LOG-SAWING MACHINE.

KENNAN'S LOG-SAWING MACHINE, worked by one man.

The saw frame is hung on jointed bars, fitted with box springs at *A* and *B*, which materially assist the back stroke, and take all strain off the wrist. The frame is strongly made of seasoned timber, and no part is liable to get out of order. The blocks to be cut are secured by an iron cramp, and short pieces are supported by a movable rest.

Price, complete as above £2 15

[2144]

LEE, CHARLES, 12 *Warwick Crescent, Kensington*.—Water barrow of light draught ; runner for box barrows ; greenhouse ventilator.

[2145]

LESLIE, BRADFORD, 2 *Abercorn Place, St. John's Wood*.—Model of a pump for irrigation in India, worked by wind.

[2146]

LIPSCOMBE, FREDERICK, & Co., 233 *Strand, near Temple Bar*.—Improved fountain jets for aquariums, conservatories, gardens.

[2147]

LOVEY, EDWARD, *Ponsnooth, Perran Wharf, Cornwall*.—Beehives.

[2148]

MAGGS & HINDLEY, *Bourton, Dorset*.—Agricultural machinery.

[2149]

MAPPLEBACK & LOWE, *Birmingham*.—Draining tools, and agricultural implements.

[2150]

MARRIOTT, JOSEPH, *Gracechurch Street*.—Apiary, working bees, unicom observatory pivot hives, humane and glass beehives.

[2151]

MESSENGER, THOMAS GOODE, *Loughborough*.—Patent triangular tubular boiler, hinged valve and indicator.

The advantage of this patented boiler is an immense surface exposed to the direct action of the fire by entirely surrounding it, the greater part being placed *over* the fire; it is exceedingly economical in fuel, and very quick in action, and the whole surface can be cleaned at any time.

The superiority of this patented hinged valve for steam, water, or gas, consists in its great simplicity, impossibility of becoming fast, its thorough efficiency, great durability, and unparalleled cheapness.

References and prices for these and general horticultural building will be supplied upon application.

[2152]

MILFORD T., & SON, *Wheel Works, Thorverton, Cullompton, Devon*.—Carts and waggons for agricultural purposes.

The IMPROVED 1-HORSE CART has obtained 11 first prizes and 2 silver medals from the Royal and the Bath and West of England Societies in 1853, '4, '5, '6, '7, '8, and 1861. Price £14 0
Harvest shelvings £1 extra.

The IMPROVED 2-HORSE WAGGON has obtained 9 first prizes and a medal from the Royal and the Bath and West of England Agricultural Societies in 1852, '3, '4, '5, '7, '8, and 1861. Price, complete £28 0

[2153]

MOODY, CHARLES PETERS, *Holway, Sherborne, Dorset*.—Patent field gate formed of machine-made duplicate parts.

[2154]

MORTON, H. J., & CO., *Basinghall Buildings, Leeds*.—Manufacturers of corrugated iron roofs and buildings, and patent cable-strained fences.

[2155]

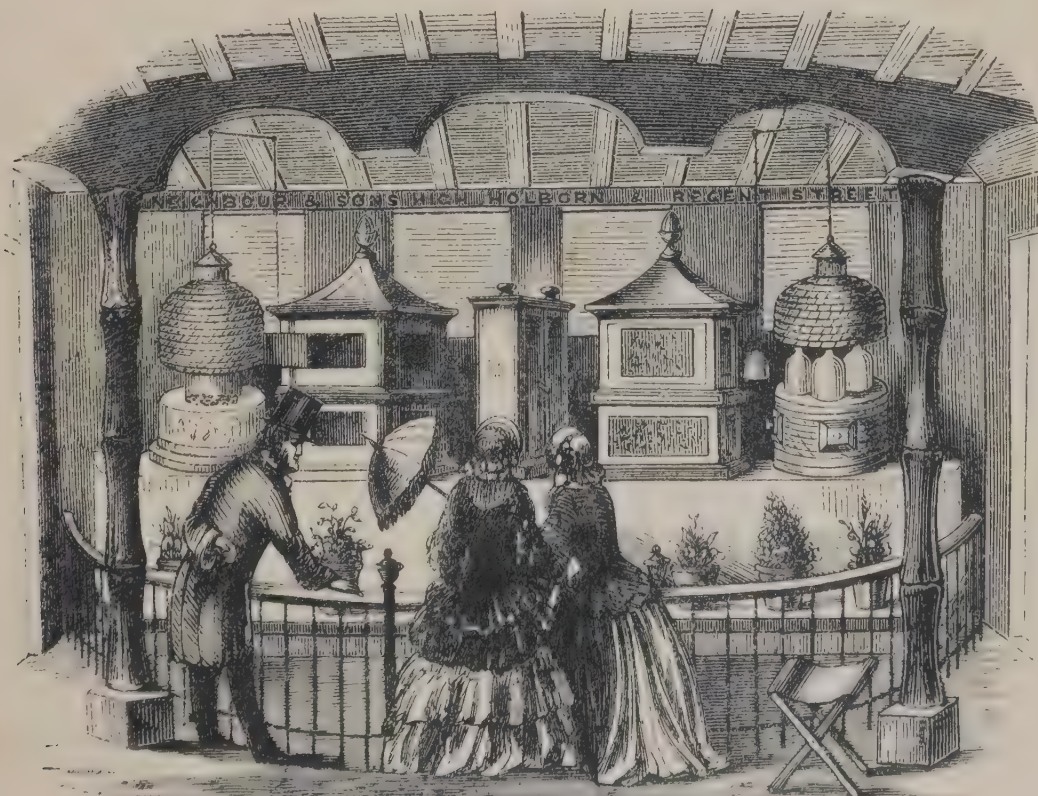
MUNN, MAJOR, *Throwley, Kent*.—Model of a beehive.

[2156]

MUSGRAVE, BROTHERS, *Ann Street, Belfast*.—Iron stalls for cattle.

[2157]

NEIGHBOUR, GEORGE, & SONS, 127 *Holborn, W.C.* and 149 *Regent Street, W.*—Beehives, bees at work.



LIGURIAN BEES AT WORK IN GLASS HIVES.

NEIGHBOUR'S IMPROVED BEE HIVES for taking honey without the destruction of the bees.

These bee hives may be viewed in full operation at the International Exhibition of 1862, Class 9.

Drawings and detailed lists will be forwarded on receipt of 2 postage stamps.

Applications for stocks of Ligurian bees, &c. may be made to Geo. Neighbour & Sons, 127 High Holborn or 149 Regent Street, London.

[2158]

NICHOLSON, WILLIAM NEWZAM, *Trent Iron Works, Newark.*—Hay machines, horse rakes, oil-cake crushers, sack lifters, garden rollers, &c.

Obtained two Prize Medals at the Exhibition of 1851.

W. N. Nicholson's factory is situated on the river Trent, by which there is communication to the iron and coal districts of Staffordshire, Derbyshire, and Yorkshire, and with the great shipping ports of Hull, Gainsborough, &c. The Great Northern and Midland Railways intersect at Newark, the latter line adjoining his Works; and by

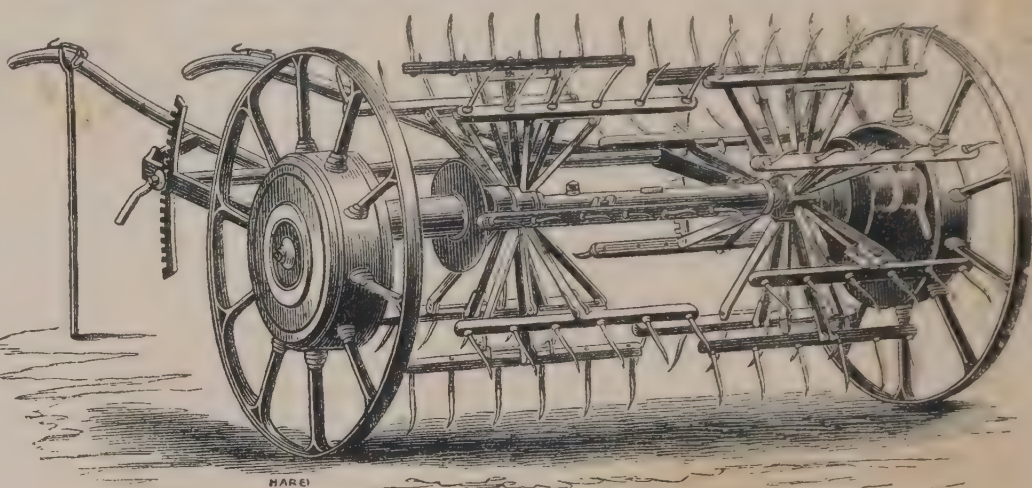
both these important lines there is direct access to the iron and coal districts, as well as to the ports of London, Liverpool, Hull, Bristol, &c. so that goods are forwarded to every part of England and Scotland on all narrow gauge lines without unloading.

AGRICULTURAL MACHINES EXHIBITED:—

1. NICHOLSON'S PATENT HAY-MAKING MACHINE, with patent tubular iron shafts, and wire screen for protecting the horse from the hay in windy weather, and other recent improvements.

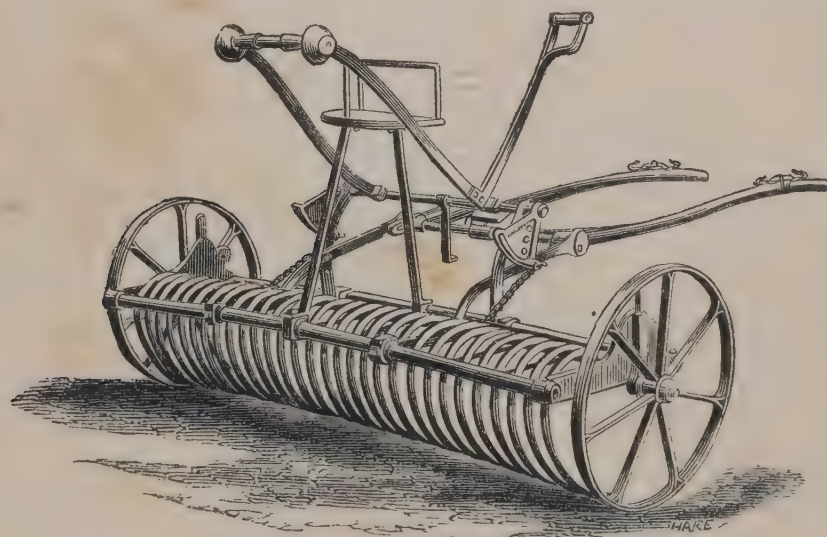
To this machine has been awarded the first prize of £4 by the Royal Agricultural Society at the great quadrennial trial of this class of machines at Salisbury, in 1857, and another prize of £4 at the Leeds trial in 1861, besides numerous other first prizes in England, France, Ireland, &c.

Several varieties are made, having the double action and reverse motion, as the one exhibited. The ordinary 1-horse machine, price £15; a stronger machine, suitable for water-meadows and uneven lands, at £16. A 2-horse machine, easy to work in the heaviest crops with a pair of light horses, having the forks divided into 4 sets; and a similar 1-horse machine.



W. N. Nicholson has also just introduced a new cheap 1-horse hay machine without the reverse motion, price only £10.

All these are usually made with the patent tubular iron horse-shafts, but can be had with wood shafts, or for the Continent or colonies, with pole for pair of horses or oxen.



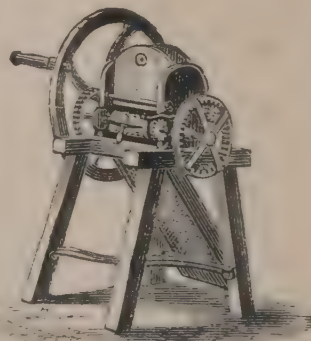
2. NICHOLSON'S PATENT HORSE RAKE, with seat, having patent tubular iron shafts and frame, and wrought-iron wheels. Several varieties of this labour-saving implement are made both with and without the seat, at prices varying from £7 10s. to £12 0

The absence of wood in their construction is of great importance, as it ensures strength and durability with lightness, as the tubular iron shafts are not liable to rot, decay, or breakage as those made of wood. The carrying wheels being of wrought-iron, cannot be broken as the ordinary cast-iron wheels. The addition of the seat is an important improvement, saving nearly one-half the labour in using, whilst the general construction and performance of the rake is not excelled by any.

3. NICHOLSON'S PATENT OIL-CAKE BREAKER. Six first prizes have been received from the Royal Agricultural Society by W. N. Nicholson for this class of machine.

The method of driving the breaking rollers so as to obtain great variation in the sizes broken, is contrived in

a most simple and effective manner, and it has met with the approval of the first mechanicians. The frames are made of iron in one piece, ensuring remarkable strength and firmness. They are made either with one or two pairs of crushing rollers, according to the purpose for which they are required. Prices from £3 10s. to £10 10s.



4. NICHOLSON'S REGISTERED SACK-RAISING BARROW by a simple arrangement allows a man to raise a filled sack the proper height for taking on the back, thereby enabling 1 man to do the work for which 3 are usually required. Two sizes are made at £2 10s. and £3 10s., the larger one being also available for merchandise in bales, or other packages.

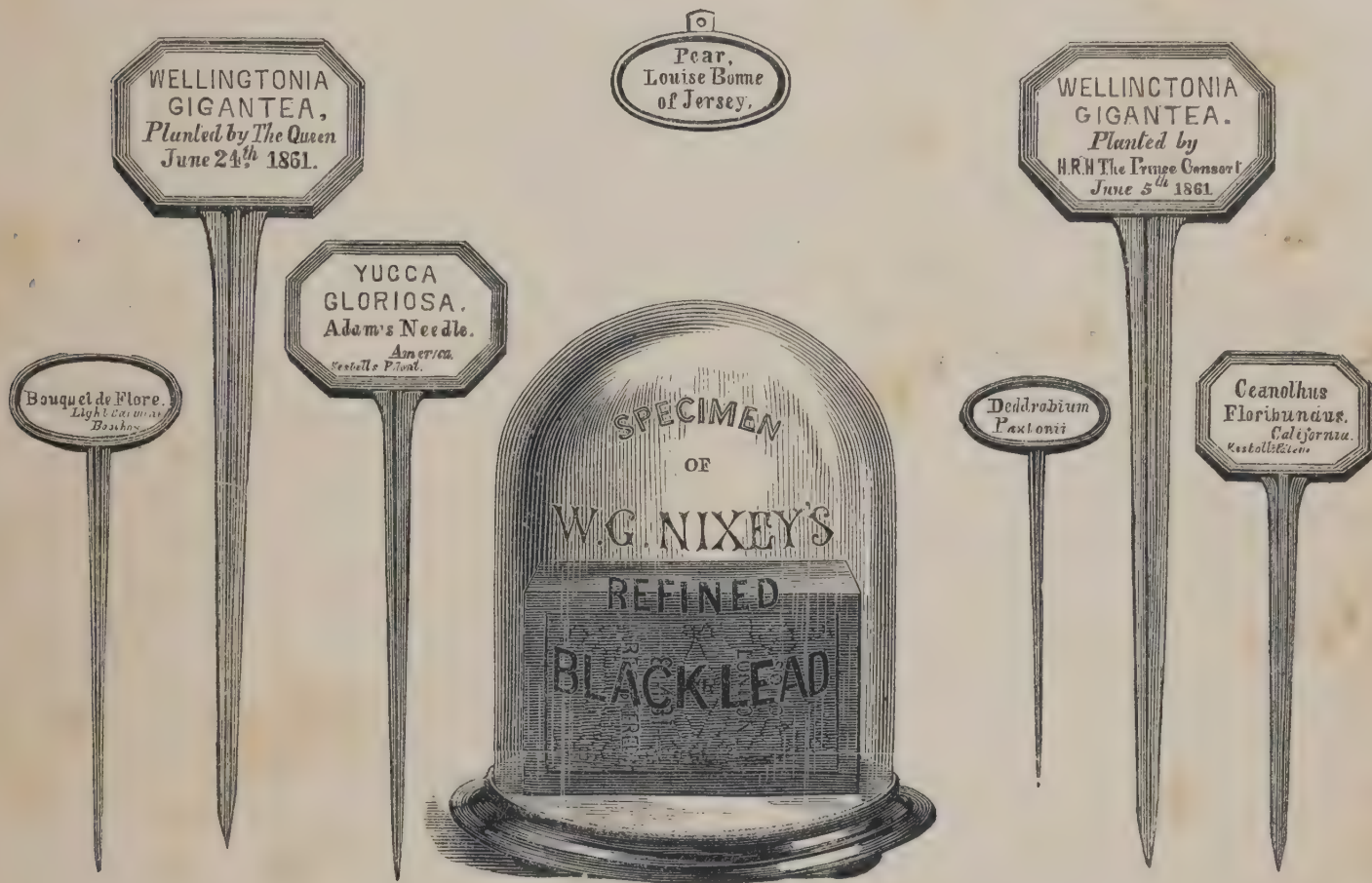
5. NICHOLSON'S IMPROVED WINNOWING MACHINES are made in 4 varieties, for large and small occupations. They are unequalled in simplicity and efficiency, and for the excellent sample they are capable of producing. A corn-elevating apparatus can be had with them, by which the clean corn is lifted into the sack without extra labour.

6. NICHOLSON'S PATENT DOUBLE-CYLINDER GARDEN ROLLER is the most perfect and effective instrument of its class, and being finished by machinery, is less liable to disarrangement than any. It is used with less labour, and can be turned round without injuring either grass or gravel.

Full particulars and catalogues of W. N. Nicholson's various inventions and manufactures, including stoves, &c. shown in Class 31, may be had free on application.

[2159]

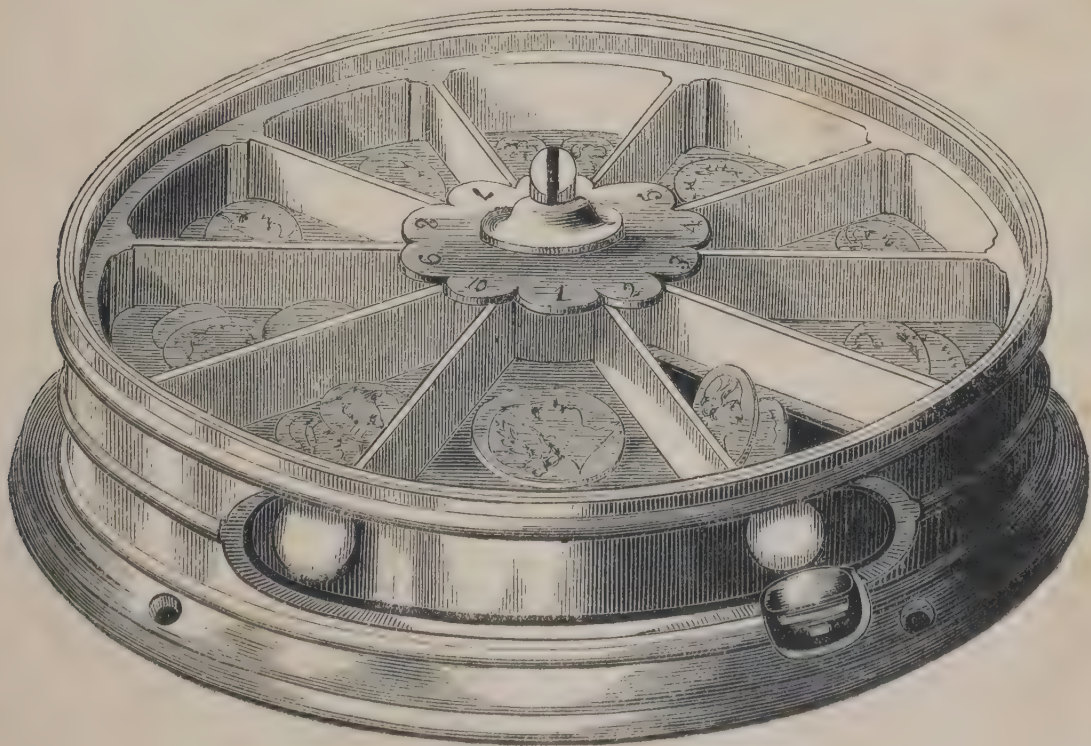
NIXEY, W. G., 12 *Soho Square*.—Patent garden labels, patent money tills, specimens of refined black-lead.



PATENT GARDEN LABELS.

PATENT GARDEN LABELS.

W. G. NIXEY'S PATENT GARDEN LABELS, composed of iron and glass hermetically sealed, are imperishable and | indestructible by time or weather. Patronised by Her Majesty the Queen.

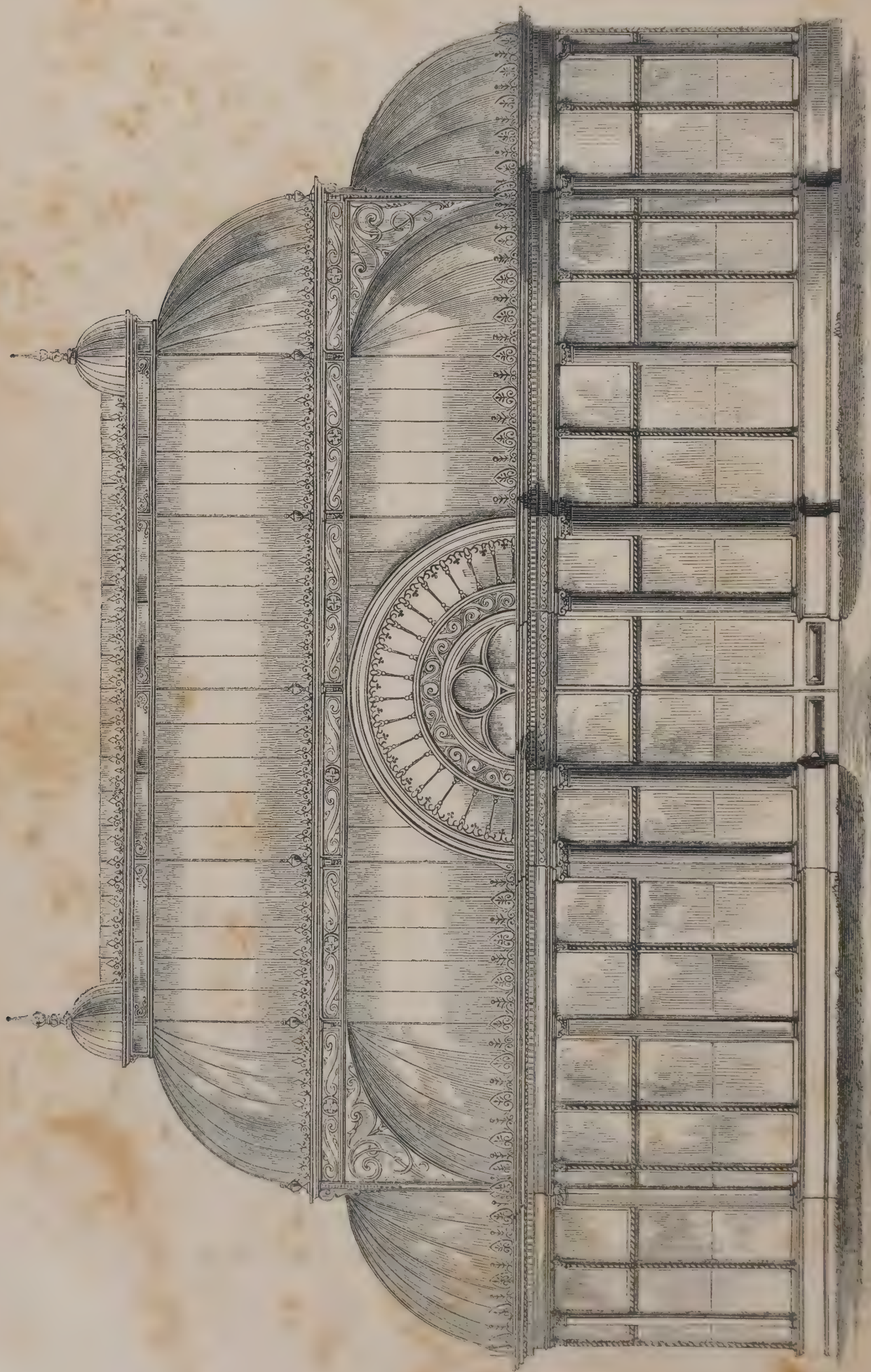


PATENT MONEY TILL.

W. G. NIXEY'S PATENT MONEY TILLS for the prevention of fraud and error, causing mutual satisfaction between employer and employed. | W. G. NIXEY'S CHEMICAL PREPARATION OF BLACK LEAD for polishing stoves and ornamental iron-work without waste or dust.

[2160]

ORMSON, HENRY. *Stanley Bridge, King's Road, Chelsea, London, S.W.*—Conservatory, hot-water tubular boilers, &c.

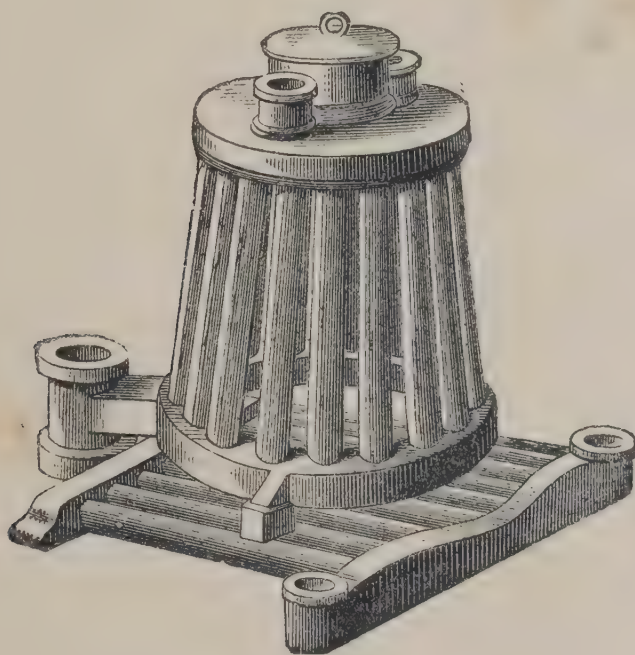


CONSERVATORY EXHIBITED BY HENRY ORMSON, HORTICULTURAL BUILDER TO HER MAJESTY.

ORMSON & SON, *continued.*

ORMSON'S PATENT JOINTLESS TUBULAR BOILER, an original invention, is now fully acknowledged to surpass the old-fashioned jointed tubular boilers, which have been made for the last 20 or 30 years by all other manufacturers. The advantages of this patent will be manifest to every person's understanding from the

following facts. For instance, one of the old-fashioned jointed boilers with 50 tubes would have 100 joints made of rope-yarn and cements exposed to the direct action of the fire; whereas in this patent there is not one joint so exposed. It should be fully understood that as the old-fashioned jointed tubular boiler



PATENT JOINTLESS TUBULAR BOILER.

increases in size, and in number of tubes and joints, its liability to leakage also increases, and hence the reason why Ormson's one-boiler system and patent jointless tubular boilers have become so universally adopted on account of their superior power, great safety, and economy:—

Ormson's No. 1 boilers are heating upwards of			
		250	ft. of pipe.
Ormson's No. 2 boilers	„	600	„
Ormson's No. 3 boilers	„	1800	„

Ormson's No. 4 boilers are heating upwards of			
		3000	ft. of pipe.
Ormson's No. 5 boilers	„	5000	„

These boilers can be made in larger sizes if required, to heat 12,000 or 15,000 ft. of pipe.

Henry Ormson, horticultural builder to Her Majesty, and hot-water apparatus manufacturer to the Commissioners of Her Majesty's royal palaces and public buildings, and to the Royal Horticultural Society, Stanley Bridge, King's Road, Chelsea, London, S.W.

[2161]

PAGE, E., & Co., *Victoria Iron Works, Bedford.*—Ploughs, horse hoes, horse rakes, chaff cutters, harrows, &c.

[2162]

PETTITT, WYATT JOHN, *The Apiary, Dorset.*—Bee-hives; Major Munn's bar-frame hive.

[2163]

PHILLIPS, GEORGE, *Harrow-on-the-Hill, Middlesex*.—Improved collateral beehives, composed of wood, glass, and zinc.

[2164]

PICKSLEY, SIMS, & CO., *Leigh, near Manchester*.—Agricultural implements. (See page 73.)

[2165]

PRIEST & WOOLNOUGH, *Kingston-on-Thames*.—Horse hoes, turnip, manure, and corn drills. (See page 74.)

[2166]

PRINCE & CO., 4 *Trafalgar Square*.—Small mechanical models of inventions.

[2167]

RANKIN, R. & J., *Liverpool*.—Patent corn cleaner, which removes smut and all impurities from the grain.

[2168]

RANSOMES & SIMS, *Orwell Works, Ipswich*; 31 *Essex Street, Strand, London*; 23 *Water Street, Liverpool*.—Steam engines, thrashing machines, screens, mills, ploughs, and agricultural machinery. (See pages 75 to 89.)

[2169]

READ, RICHARD, 35 *Regent Circus, Piccadilly*.—Horticultural engines, machines, and syringes, of every description.

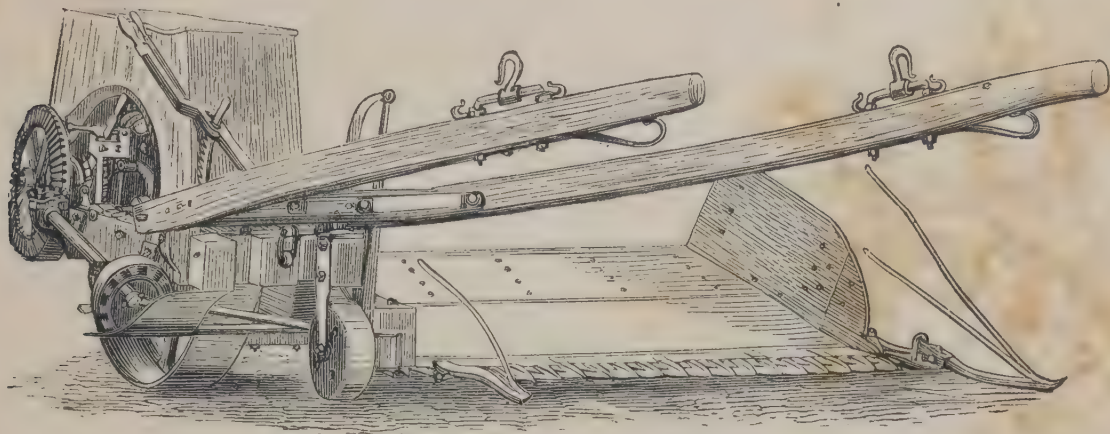


HORTICULTURAL ENGINES, MACHINES, AND SYRINGES, manufactured only by Richard Read, instrument maker (by appointment) to Her Majesty.

[2170]

REEVES, ROBERT & JOHN, *Bratton, Westbury, Wilts*.—Liquid manure drills, manure distributors, patent corn manure, and turnip drills, &c. (See page 90.)

PICKSLEY, SIMS, & Co., *Leigh, near Manchester.*—Agricultural implements.



REAPING MACHINE FOR CUTTING GRAIN AND ARTIFICIAL GRASSES. (Price £25.)

This machine obtained the

First prize at the Royal Agricultural Society's Show at Leeds, 1861.

First prize at the East Lothian Agricultural Society's Show at Haddington, 1861.

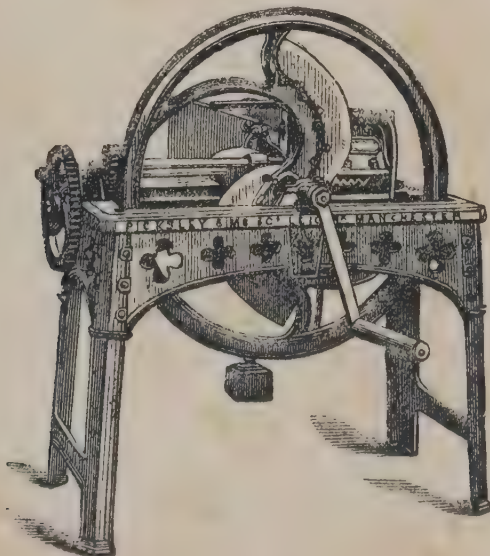
First prize at the North Lonsdale Agricultural Society's show at Ulverstone, 1861.

First prize at the Leyland Agricultural Society's Show at Leyland, 1861.

The first prize was also awarded to P. S. & Co. at Leyland, for their combined reaping and mowing machine (Bamlett's patent), price £35, in competition with Woods'.

Since taking the above prizes, however, P. S. & Co. have incorporated several important improvements suggested by the experience of last season, and they can now warrant the machine as the champion reaping machine for manual delivery.

Priced catalogues may be obtained post-free on application at the Works, as above.



CHAFF CUTTER. (No. 1A, price £4.)

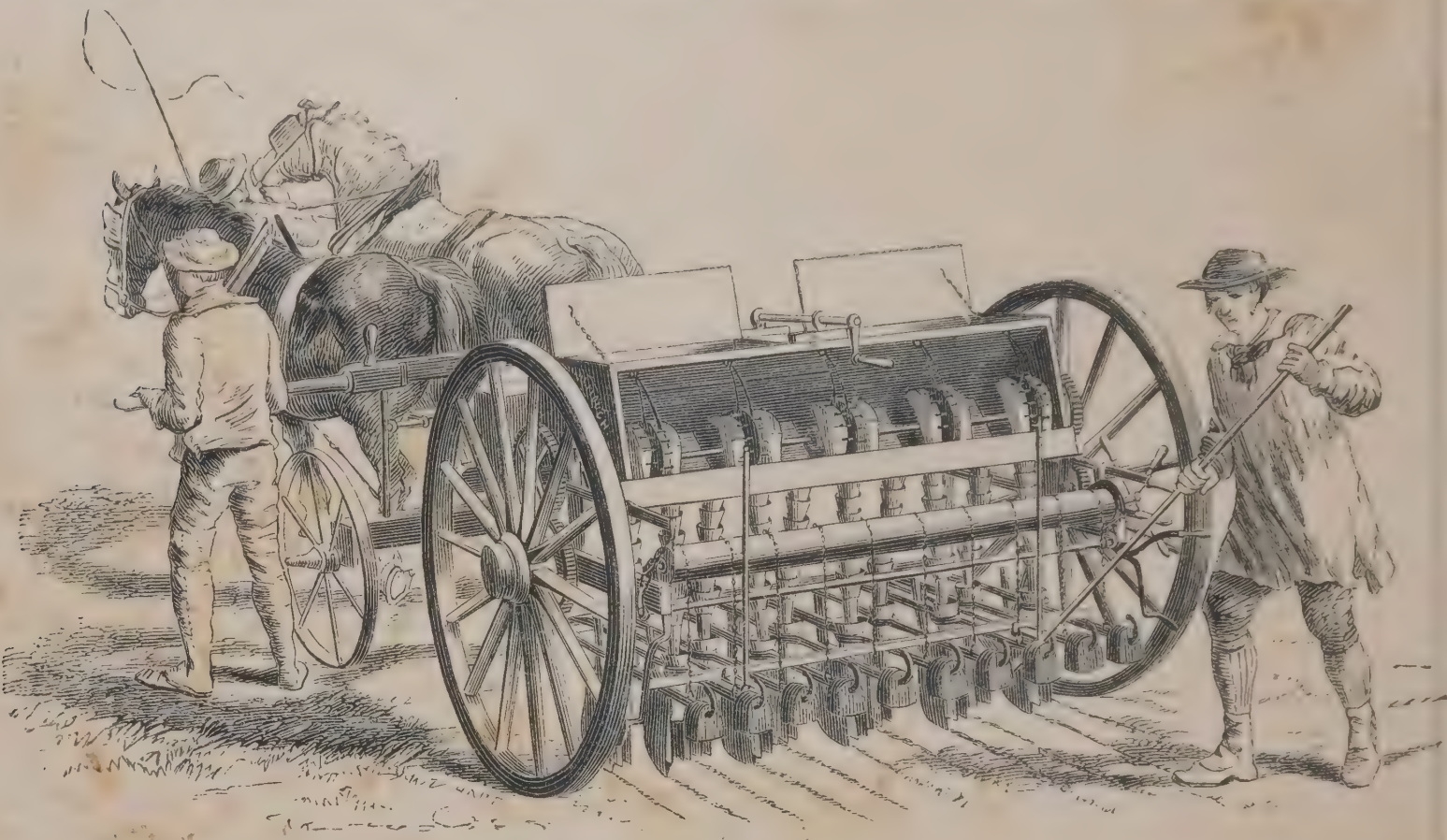
P. S. & Co. have in 1861 with their celebrated machines taken upwards of 50 first-class prizes at the Royal and other principal agricultural shows in England, France, and Australia.

Chaff cutters. from £2 5 to £25 0
Oat and bean mills. . . . from 3 10 to 15 0

Grinding mills from £8 10 to £15 0
Turnip cutters from 3 0 to 6 10
Turnip pulpers from 3 10 to 8 10
Lawn-mowing machines . . from 5 0 to 7 10

P. S. & Co. are the sole and exclusive makers of Bamlett's patent reaping machine.

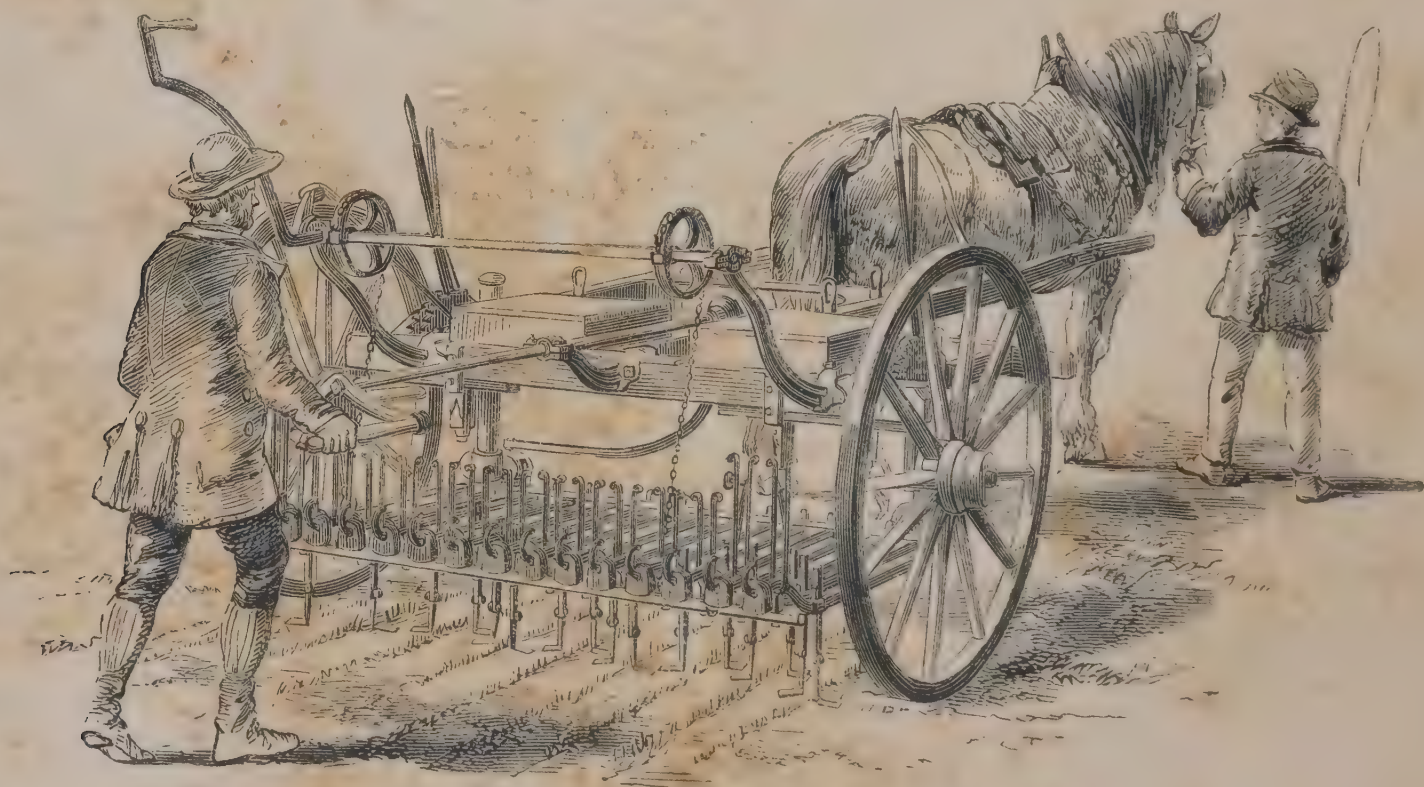
PRIEST & WOOLNOUGH, *Kingston-on-Thames*.—Horse hoes, turnip, manure, and corn drills.



PRIEST & WOOLNOUGH'S IMPROVED CORN DRILL, with ore carriage steerage attached, is adapted to all the requirements of a farm for depositing wheat, barley, beans, peas, turnips, mangold, Indian corn, or maize, clover, and any other grain or seed.

PRIEST & WOOLNOUGH'S IMPROVED DRILL for turnips and manure.—*Obtained the Royal Agricultural Society of England's prize at Leeds, 1861.*

This drill is for the purpose of depositing turnips, or mangold wurtzel with guano, superphosphate, or other highly concentrated manures.



PRIEST AND WOOLNOUGH'S PATENT FIRST PRIZE HORSE-HOE.

Obtained the Royal Agricultural Society's prizes at Salisbury, 1857, and at Leeds, 1861; a special medal at Vienna, 1857, and gold medal at Paris, 1860.

PRIEST & WOOLNOUGH'S PATENT LEVER HORSE-HOE for light lands and small occupations.

This implement is adapted for hoeing between the rows of drilled crops of every description, either on the level surface or on ridges. It is made a corresponding width

with the drill it is to follow, and will hoe at once as many rows as were drilled.

PRIEST & WOOLNOUGH'S DRILL for light land or small occupations.

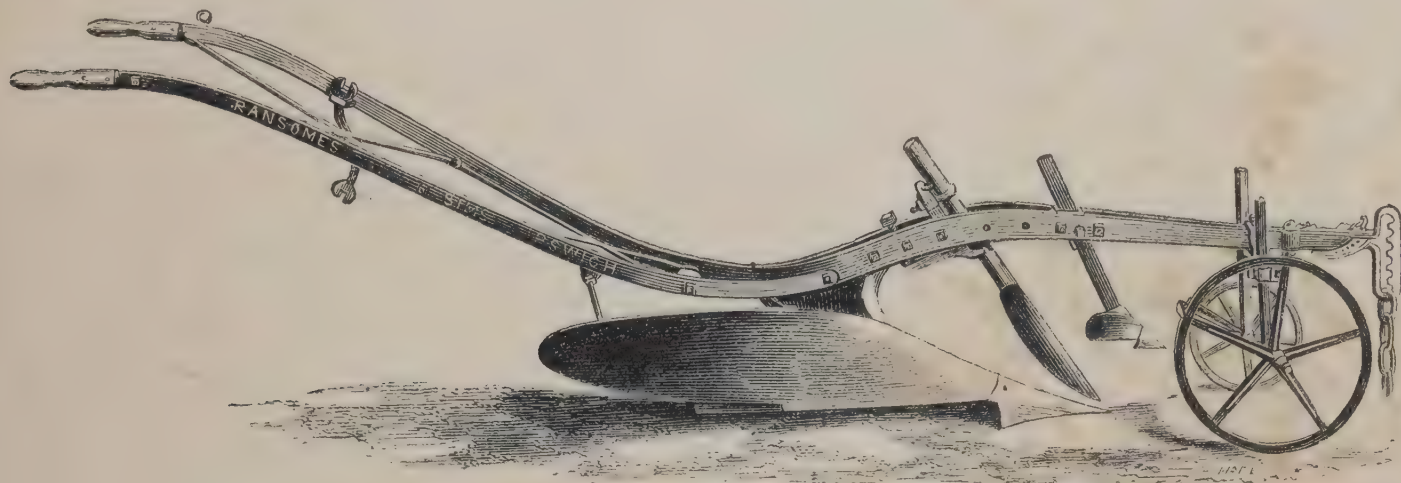
This drill is the same in principle as the corn drill before described, but made altogether lighter.

RANSOMES & SIMS, *Orwell Works, Ipswich* ; 31 *Essex Street, Strand, London* ; 23 *Water Street, Liverpool*.—Steam engines, thrashing machines, screens, mills, ploughs and agricultural machinery.

SECTION I.—PLOUGHS.

PATENT TRUSSED-BEAM IRON PLOUGH, marked Y W B, made principally of wrought-iron, and intended for ordinary ploughing with two or more

horses. The annexed cut represents this plough in the form in which it is ordinarily used for prize ploughing.



RANSOMES AND SIMS' PATENT TRUSSED-BEAM IRON PLOUGH Y W B.

This plough forms one of a series of four ploughs, three of which obtained prizes at the last ploughing match of the Royal Agricultural Society of England, at Warwick, in 1859. This series of ploughs is modelled after our well-known ploughs, the Y L and Y R C, which have received the following prizes from the Royal English Agricultural Society, &c. &c. :—

The prize of £10 and silver medal, as the best heavy land plough ; also to the same plough, a prize of £10 and silver medal as the best light land plough, at the Royal Agricultural Society's meeting at Southampton.

A prize of £10 at the Royal Agricultural Society's meeting at Northampton.

The council medal of the Great Exhibition with this plough as made by Busby.

The first prize at the meetings of the Royal Agricultural Society at Lewes, 1852, at Lincoln, 1854 ; and again at the Carlisle meeting, 1855 ; as the best plough for general purposes.

The divisional prize at the Bath and West of England meeting at Tiverton, 1855.

The prize for deep ploughing at the Royal Agricultural Improvement Society of Ireland, Carlow meeting, 1855.

This is the medium-sized plough of that series, two smaller sizes, and one larger being made.

The *handles* are of sufficient length to give perfect command over the ploughs.

The *beam* is on their patent trussed principle, by which greater rigidity and strength are secured, with the same weight of metal, than can be obtained by an ordinary solid beam. This construction of the beam also permits the coulter to be placed quite centrally, so that it does not require to be necked, and is therefore more easily kept in its proper position than when it is necked, which it must always be in solid-beam ploughs.

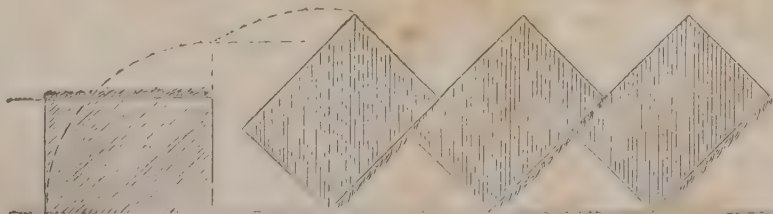
The *wheels* are carried on one cross bar, the advantage of which is, that they can be more firmly fixed in any desired position, and can be more quickly shifted, than when they are carried on two separate bars, also that the whole of the wheel fastenings are rendered extremely simple, without omitting any adjustment, that can possibly be required for either the land or furrow wheels.

The *draught* is taken directly from the head, for the result of very careful experiment has convinced R. and S. that in a properly constructed plough, the draught bar is quite needless and often very injurious.

The *share* is fixed to a wrought-iron movable lever neck, which allows it to be set with more or less pitch, as may be required, and the arrangements for fixing the neck in the desired position are very simple and effective. The form of the share and of the mould board is the result of a series of most careful experiments on a variety of soils. They will be found to leave the furrow slice neatly turned over at an angle of 45°, leaving the upper edge full and sharp. The ploughs are very steady in work, and leave the furrow bottom clean and square.

The *skim coulter*.—This is a very useful addition to a plough, particularly when ploughing clover, ley, or stubble. It just pares the surface, and turns into the bottom of the furrow all long grass, weeds, stubble, &c. which are then completely buried and enrich the soil by their decomposition. A weight attached by a chain to the coulter, is often used when the grass is long to assist in drawing everything cut by the skim coulter into the furrow, so that it may be thoroughly covered. This chain is also useful when ploughing in manure.

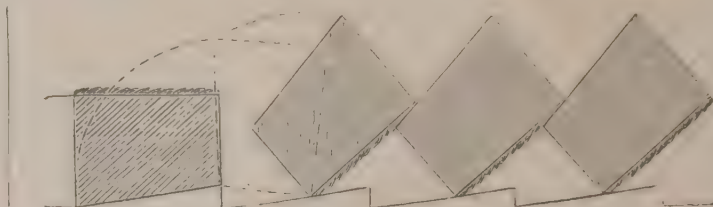
The plough as shown in the above cut is fitted to cut a rectangular furrow slice, and to deposit it so, that the angle A B C is a right angle, and the side A B equal to the side B C, as shown in the accompanying diagram. This is the ordinary form of ploughing, which is considered in England most advantageous for producing a crop ;



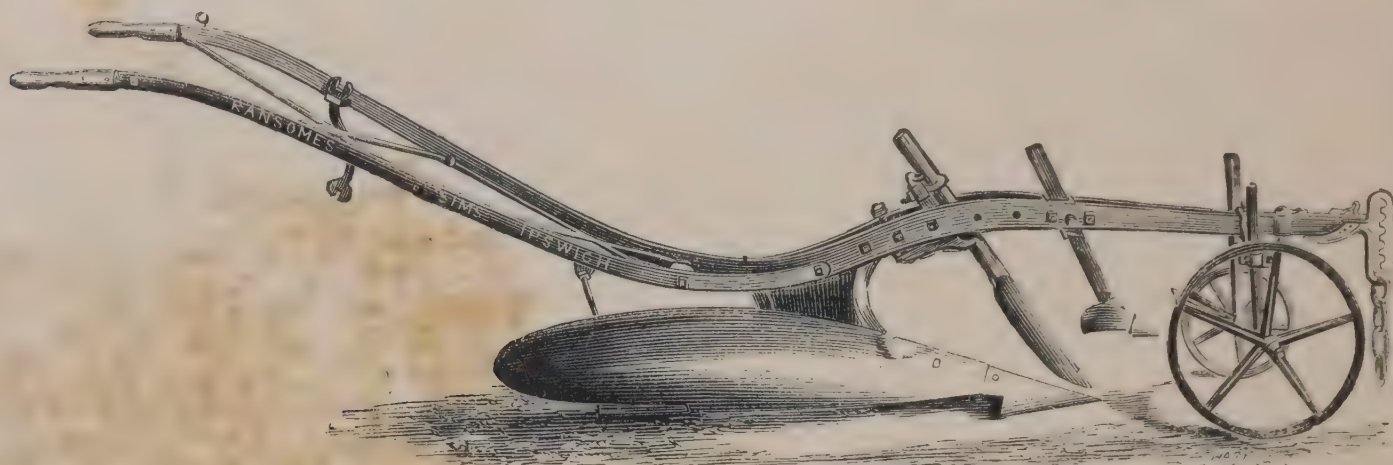
RECTANGULAR FURROW SLICE.

RANSOMES & SIMS, *continued.*

but if desired the same plough may be fitted with a mould board and share suitable to cut a furrow of a trapezoidal section, and deposit it so that the side A B is equal to B C, and the angle A B C is somewhat less than a right angle, as represented in the accompanying diagram.



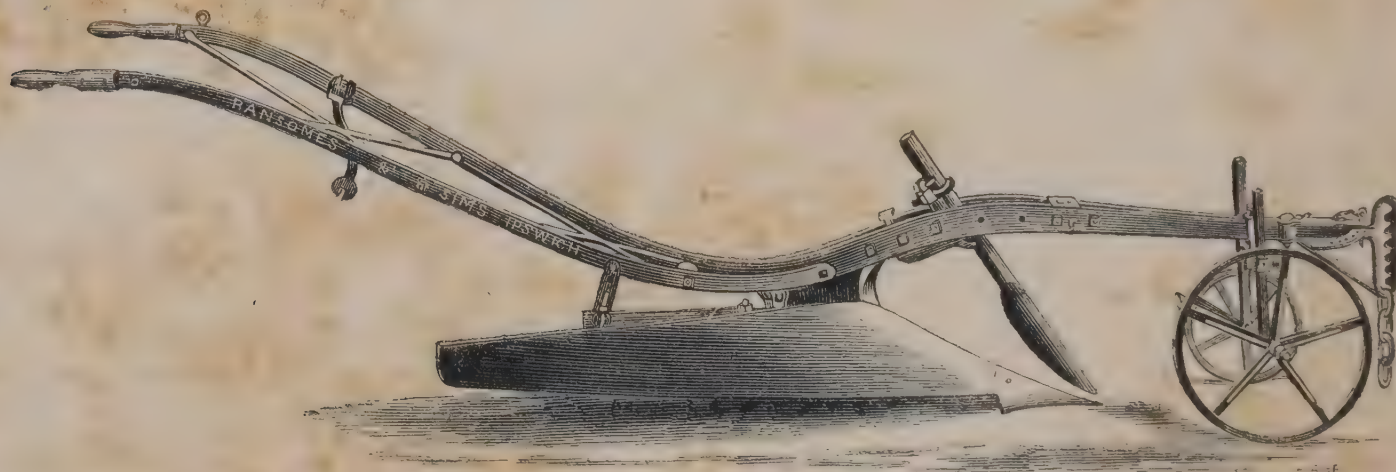
CRESTED FURROW SLICE.



RANSOMES AND SIMS' PLOUGH Y W B FOR PRODUCING CRESTED FURROWS.

This form of furrow is usually termed a "crested" furrow. It possesses the advantage of exposing rather more surface to the atmosphere than the rectangular furrow, but to set against this, there is one-ninth less soil moved when ploughing with the same depth, than on

the previous plan, in consequence of the furrow bottom being inclined to the land side, instead of at right angles to it, and the horses must travel two miles further per acre to plough the same depth of furrow than is necessary on the rectangular system.



RANSOMES AND SIMS' PLOUGH Y W B FITTED AS A KENT PLOUGH.

This plough may also be fitted with a mould board and share, as shown above, which cuts a furrow slice of a rectangular section, and turns it completely bottom upwards, as shown in the annexed diagram, thus exposing

the lower soil to the fertilising action of the atmosphere, and burying all the surface vegetation so that it decomposes and enriches the soil.



KENTISH FURROW SLICE.

Ransomes & Sims have mould boards suitable for producing each of the above-described forms of furrow, on either heavy or light land, and being interchangeable

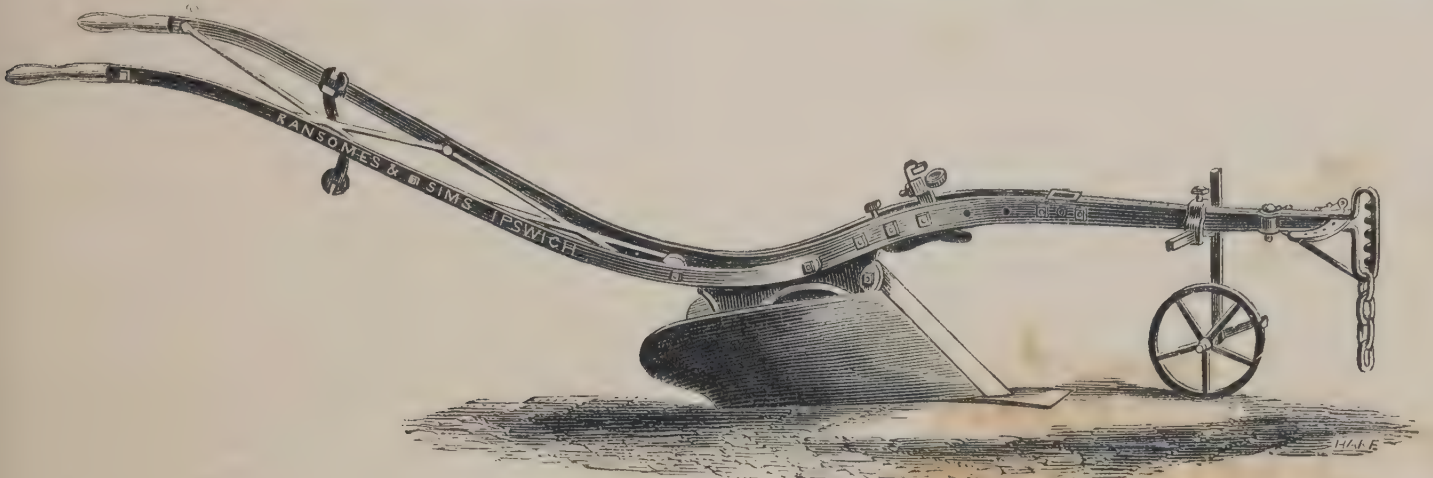
one with another at pleasure this plough becomes a very complete implement.

By removing the ordinary body from the plough and

RANSOMES & SIMS, *continued.*

also the furrow wheel, and substituting a ridging body (which may be done in a few minutes), this plough becomes a convenient moulding or ridging plough, as shown below,

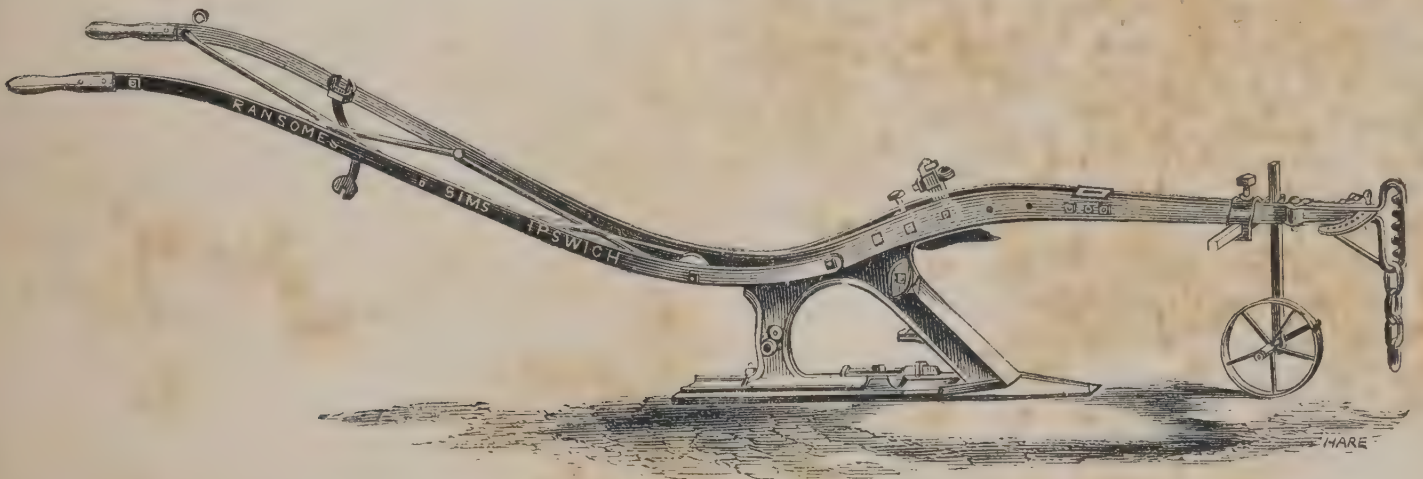
which is useful for setting out land, for ordinary ploughing, for ridging or moulding up beet-root, potatoes, or other plants sown on the ridge, and for opening water furrows.



RANSOMES AND SIMS' PLOUGH Y W B, WITH RIDGING BODY.

By removing the mould boards from this body the plough is adapted (as shown in the engraving), for breaking

up the subsoil after the plough, the land being thus stirred from 12 to 14 in. deep.

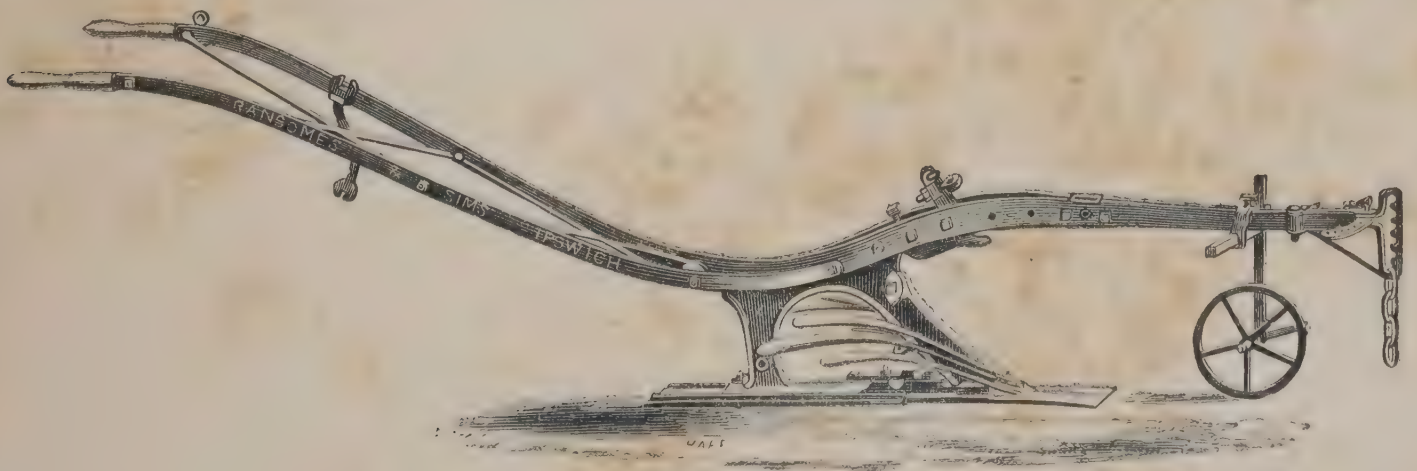


RANSOMES AND SIMS' PLOUGH Y W B, WITH A SUBSOIL BODY.

By attaching to the frame a pair of open-ribbed mould boards (as shown below), the plough is adapted for raising potatoes, which operation it performs in a superior

manner, leaving fewer in the ground than when raised with a fork, and not damaging the potatoes.

Although the practice of using the same implement for



RANSOMES AND SIMS' PLOUGH Y W B, WITH A POTATO BODY.

various dissimilar purposes, where the land under cultivation is of sufficiently large extent to justify the use of a special implement for each purpose, cannot be recommended, yet inasmuch as this plough in each of its forms is perfectly complete, and will perform each operation thoroughly, there are occasions when it will be conve-

nient and desirable to employ it as an interchangeable implement in the manner described above.

PATENT TRUSSED-BEAM IRON PLOUGH, marked Y X.

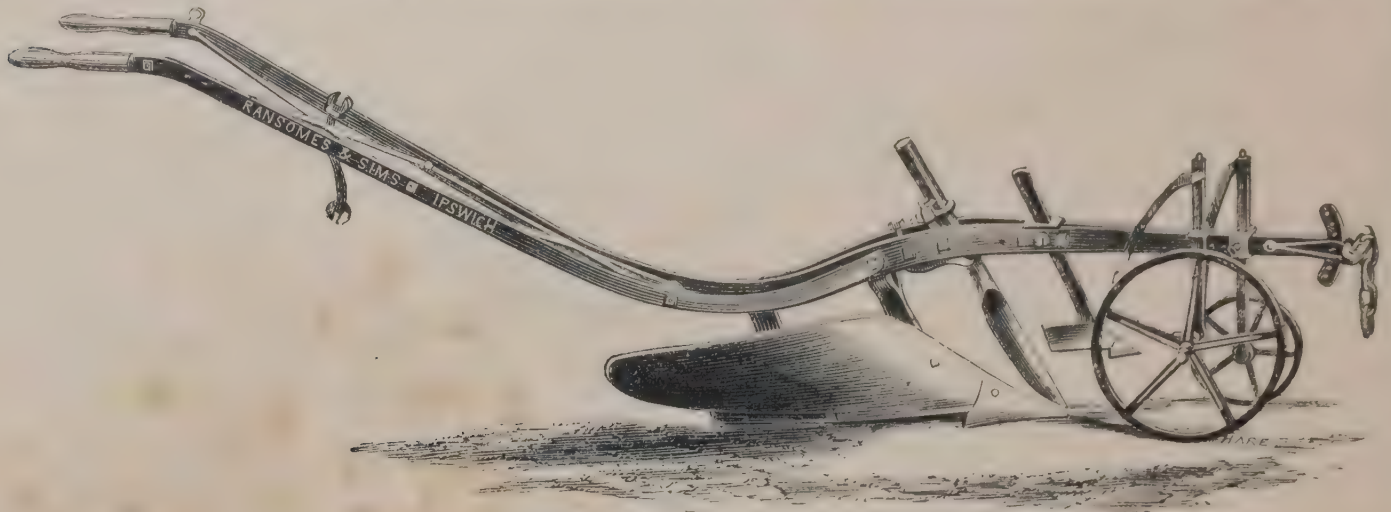
This is the smallest of the Warwick series of prize ploughs (described above), and is suitable for two horses on light and mixed soils.

RANSOMES & SIMS, *continued.*

PATENT TRUSSED-BEAM IRON PLOUGH, marked Y F L.

This plough is fitted with Ransomes & Sims patent trussed beam; the frame is of wrought-iron, and the mould board is shorter and of a different model to that adopted in our prize ploughs. This plough is extensively used

abroad in cases where the land is newly cleared, as in consequence of the great strength of the beam and frame, it is well suited for resisting strains from roots of trees, stones, &c., and being shorter than the improved prize ploughs, it is more handy in use for such purposes.



RANSOMES AND SIMS' PLOUGH Y F L.

IMPROVED PATENT TRUSSED-BEAM IRON PLOUGH, marked Y F R.

This plough is intended for producing furrow slices of

a rectangular section, and of much greater width in proportion to the depth, than is usual in English ploughing.

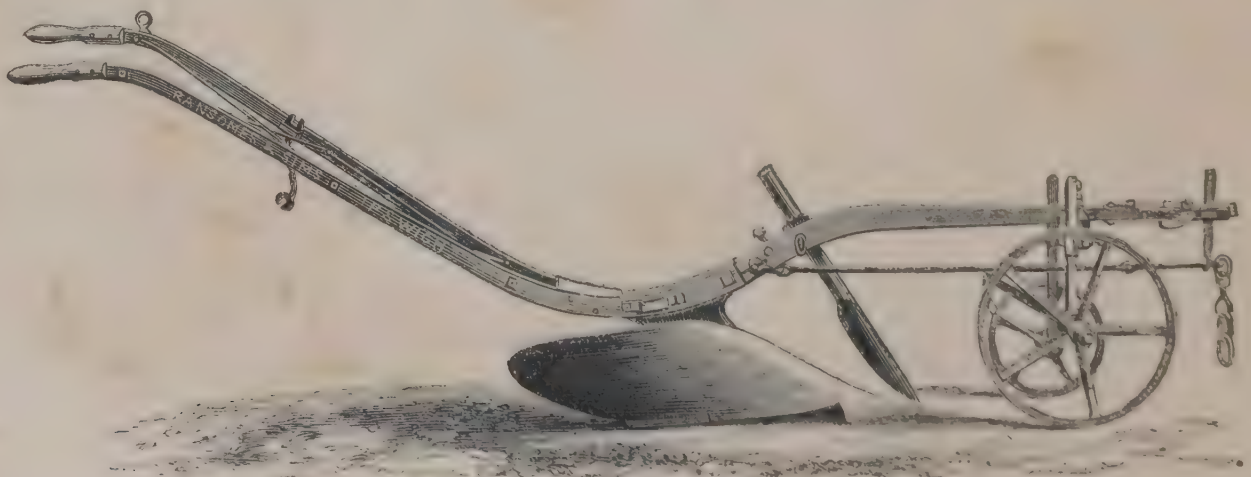


RANSOMES AND SIMS' PLOUGH Y F R.

IMPROVED SOLID-BEAM IRON PLOUGH, marked B F S, constructed principally of wrought-iron, and suitable for use with one large or two small horses.

In this plough, which forms one of a series comprising one smaller and two larger sizes, the draught is taken from

the body of the plough instead of from the end of the beam, the intention of which is to relieve the beam from strain. In other respects, it is constructed on similar principles to the ploughs previously described, and will make equally good work, but it is only adapted for producing a rectangular furrow.

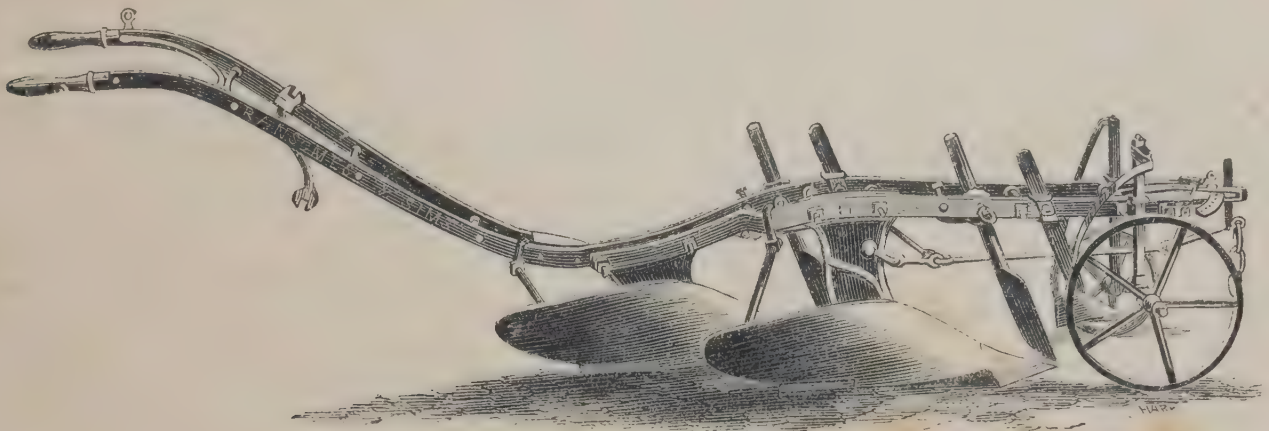


RANSOMES AND SIMS' PLOUGH B F S.

RANSOMES & SIMS, *continued.*

This series of ploughs is also provided with ridging and subsoil bodies as previously described with the Y W B, and two sizes of it are also made as double furrow ploughs

for turning two furrows at the same time, and thus saving one man, as shown in the subjoined diagram.

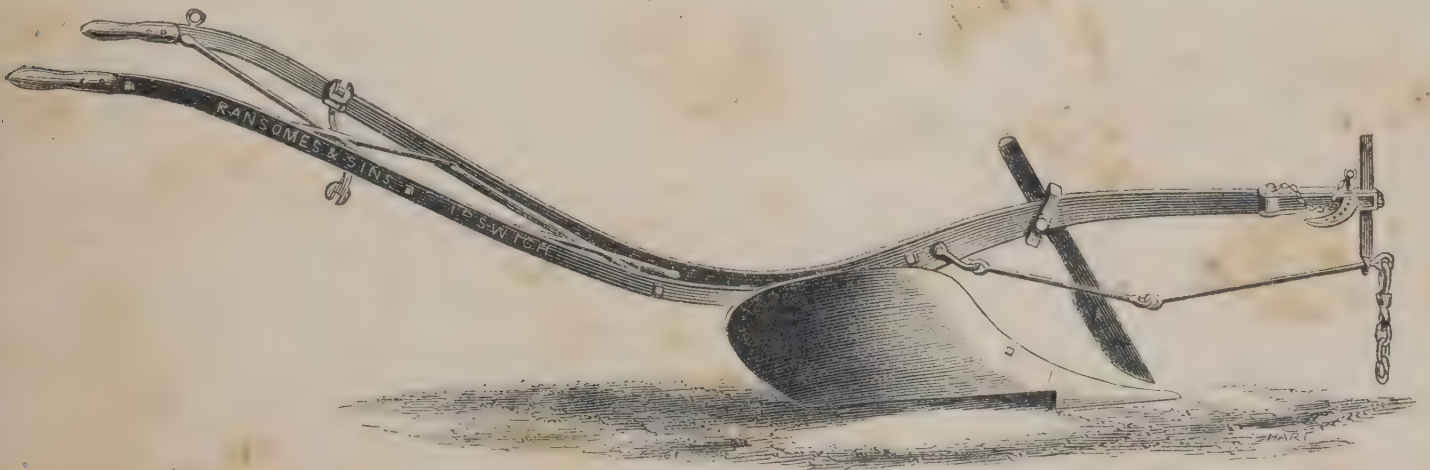


RANSOMES AND SIMS' DOUBLE-FURROW PLOUGH.

IMPROVED SOLID-BEAM IRON PLOUGH, marked T C.

This plough is constructed entirely of wrought-iron with the exception of the mould board, and it will turn a furrow from 6 to 10 inches deep, and from 9 to 15 inches

wide. It is strong enough to resist the strain of 10 horses or 12 or 14 bullocks; but it may be easily worked by 2 or 3 horses. The short beam and great length of handle give the holder a great command over it, and it is extremely suitable for breaking up new and rough land.

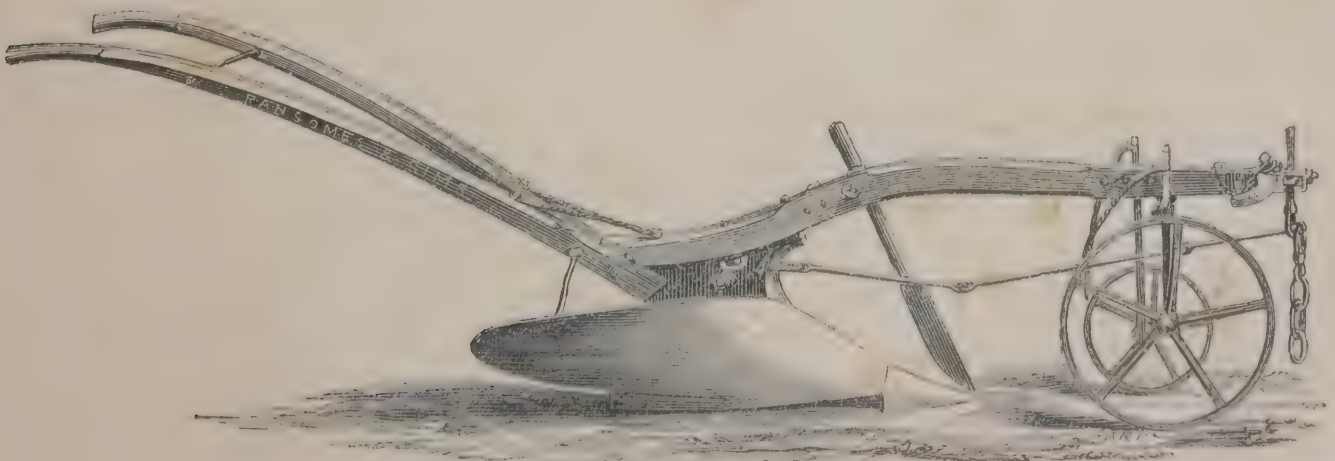


RANSOMES AND SIMS' PLOUGH T C.

IMPROVED PLOUGH, with wood beam and handles, marked W V R L.

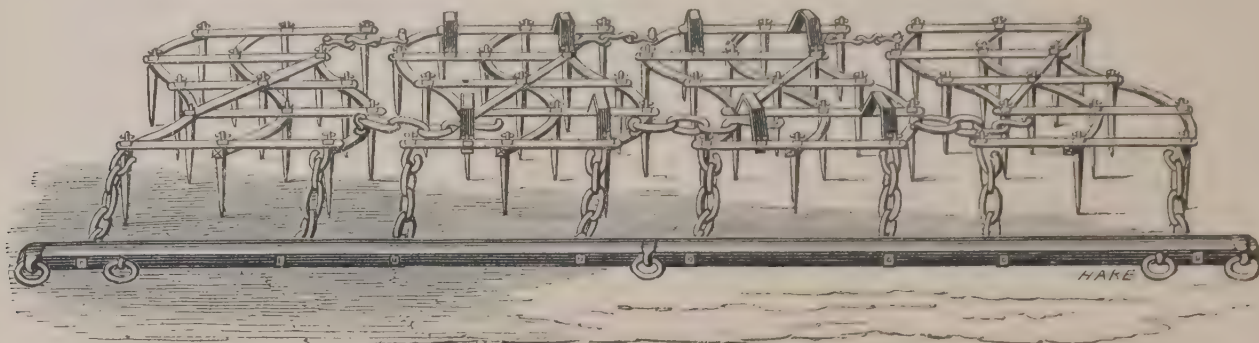
In this plough, the beam and handles are of well-seasoned timber. The draft is taken from the body of

the plough, which is designed on the same model as those of the exhibitors' best iron ploughs, and will produce equally good work; but being partially of wood, it is not so expensive in the first cost.



RANSOMES AND SIMS' PLOUGH W V R L.

RANSOMES & SIMS, *continued.*

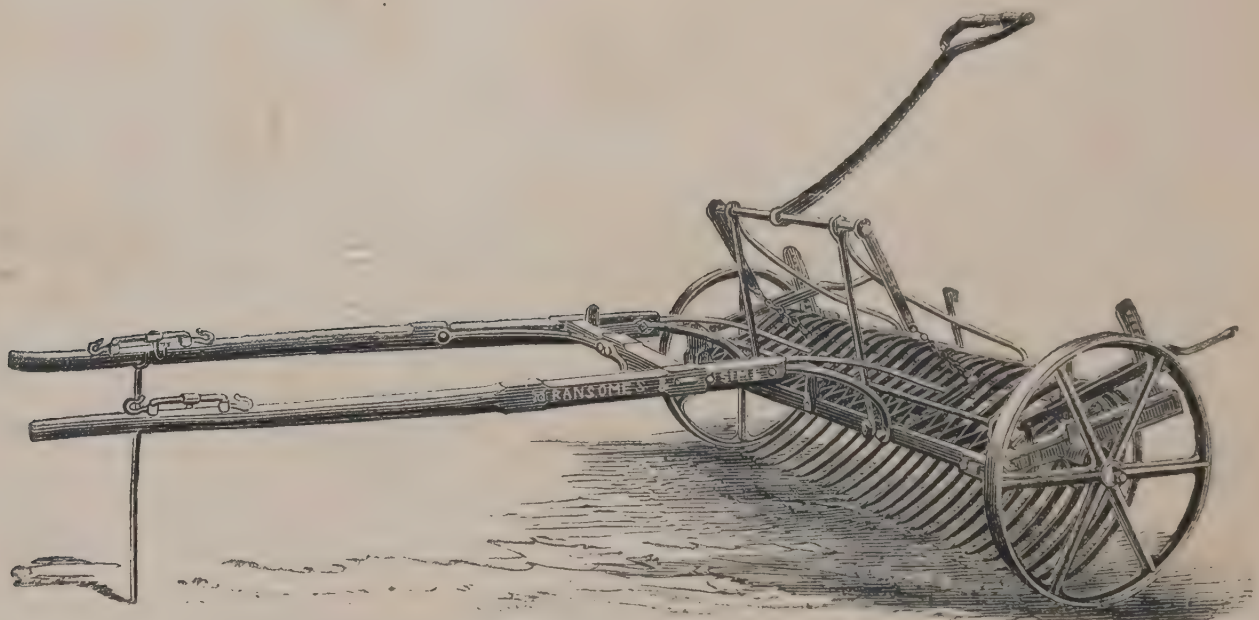


RANSOMES AND SIMS' IMPROVED EAST ANGLIAN HARROW.

SET OF IMPROVED EAST ANGLIAN HARROWS.

The beams are diagonally braced; the teeth tracks equally distant. The teeth will not shake loose in work; the harrows will not run over each other in rough work, and are fitted with hind hooks to draw the contrary way, so as to give a lighter finish in seed harrowing. They are made in the following sizes, and all with 5 rows of teeth:

No. 1. Light harrows.	4 to a set.	4-Beam Harrows.	Cover 9 feet 3 inches.
3 "	2 "	7 "	0 "
2 "	2 "	4 "	8 "
No. 2. Medium Harrows.	4 to a set.	3-Beam Harrows.	10 feet 0 inches.
3 "	2 "	7 "	6 "
2 "	2 "	5 "	0 "
No. 3. Heavy Harrows.	4 to a set.	3-Beam Harrows.	10 feet 0 inches.
3 "	2 "	7 "	6 "
2 "	2 "	5 "	0 "



RANSOMES AND SIMS' IMPROVED IRON HORSE DRAG-RAKE.

IMPROVED IRON HORSE DRAG-RAKE. Highly commended at the Royal Agricultural Society's meeting, Lincoln, 1854. Prize, Paris Exhibition, 1856. Obtained the First Prize of the Royal Agricultural Society at Salisbury, 1857.

Horse rakes are used for collecting hay, corn, stubbles, twitchgrass, &c. for raking in clover and grass-seeds, and as weed extirpators on young cereal crops, for which purposes they are of the highest utility, performing the work more cheaply and thoroughly than can be done in any other way.

Each tooth swings independently of the other, so that the whole set readily adjusts itself to uneven land. The frame is also furnished with side levers, so that the rake can be used with one wheel in the furrow if necessary. There is an arc on the shafts, so that the teeth may be set to penetrate the ground, or skim the surface lightly, by which they are prevented from collecting the soil or

rubbish with the corn, or from pulling up the young clover when raking barley. Each alternate tooth can be raised out of work when desired, so as to form a coarse rake. This is useful when raking twitch, or other weeds, brought to the surface by harrowing. The wheels are of iron, and capped to prevent the admission of dirt.

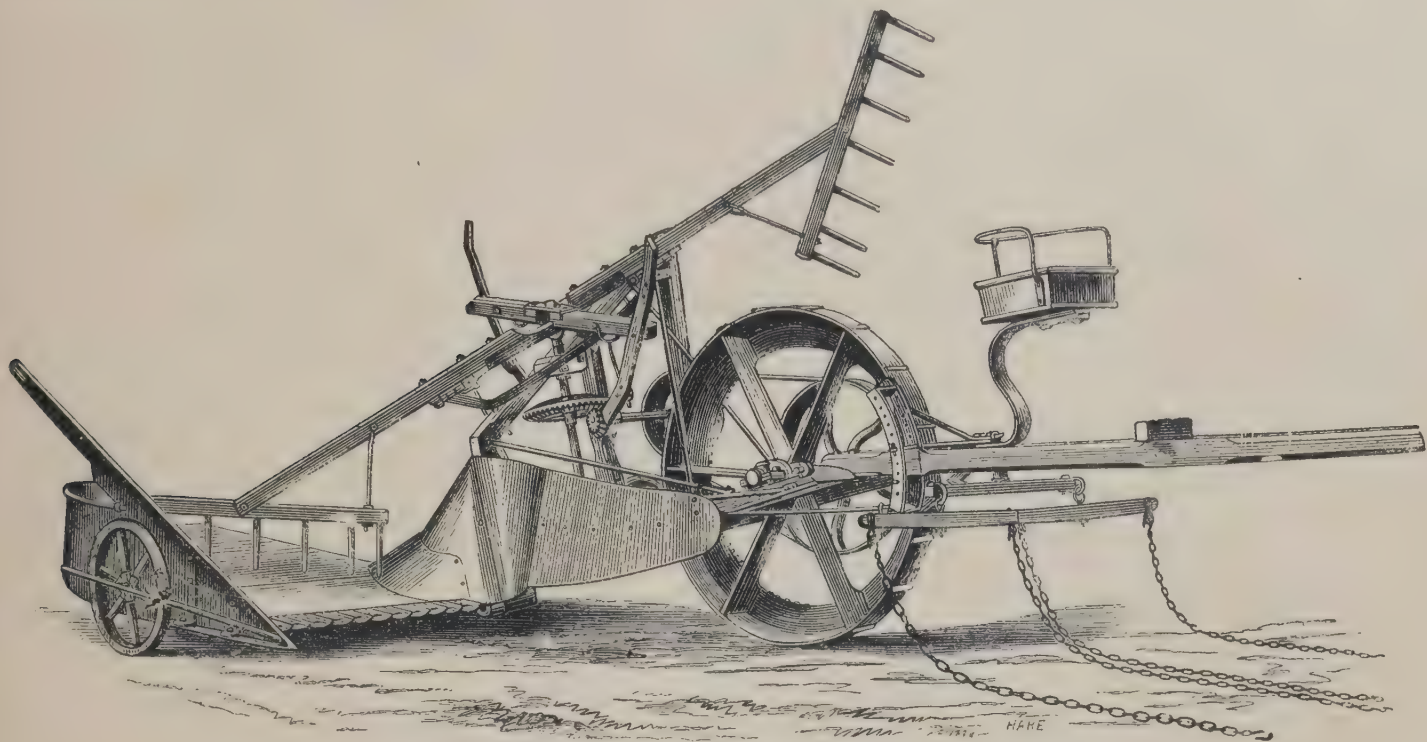
They are made in three sizes, and with steel or iron teeth. The steel teeth are much the lightest and most durable.

A lad can clear the rake of its load instantaneously, without stopping the horse.

PATENT SELF-BALANCING HORSE DRAG-RAKE.

In this rake the driver rides on a seat so arranged that the weight of his body partly counterbalances the teeth. The rake is cleared by the driver depressing the foot-board, and as the driver rides, much more land can be got over in a day, than with those rakes in which he has to walk behind.

RANSOMES & SIMS, *continued.*

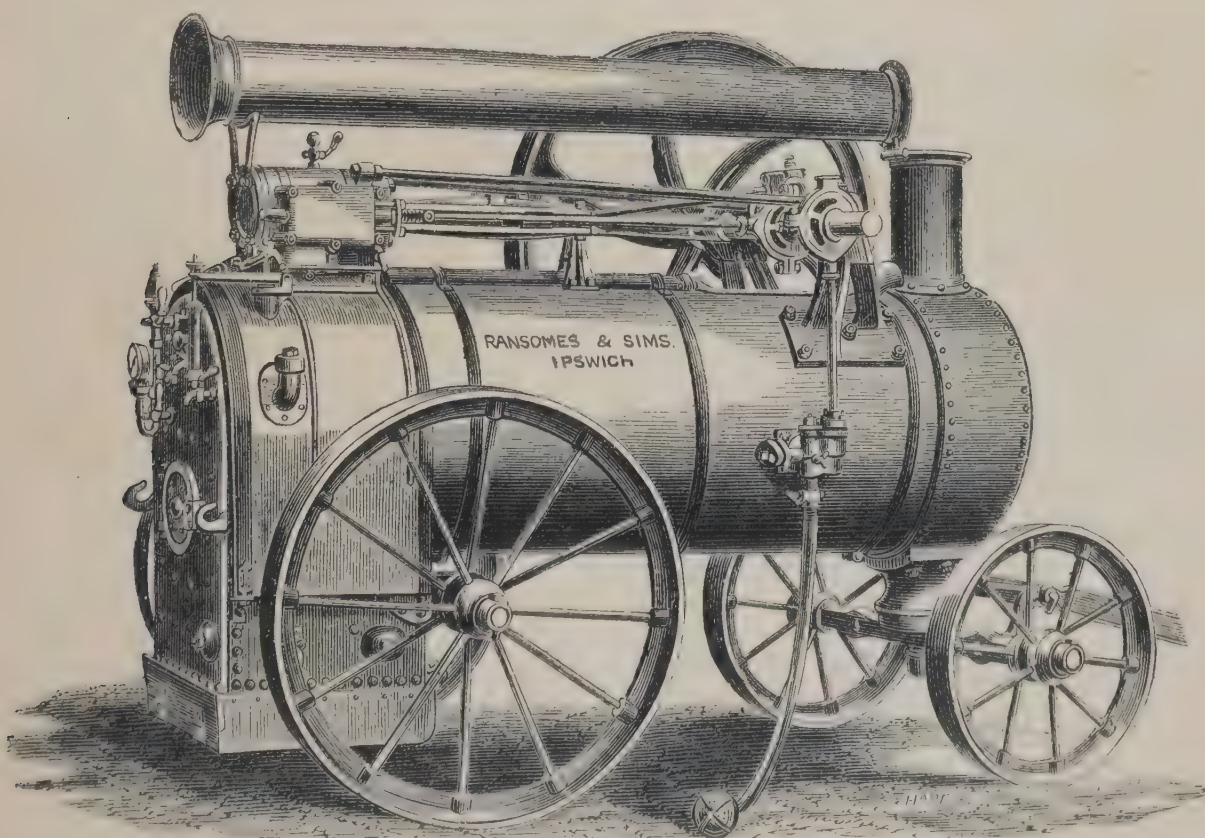


RANSOMES AND SIMS' PATENT SELF-RAKING VICTORIAN REAPER.

MODEL OF RANSOMES' PATENT SELF-RAKING VICTORIAN REAPER.

This machine is suitable for cutting any description of cereal crop, and delivering it at the side of the machine in neatly-formed sheaves. The automatic delivery is extremely simple, and capable of variation according to the weight of the crop.

It consists of a series of rakes and arms which revolve round a vertical shaft under the guidance of an irregular waved ring or cam, in such a manner that they bring the grain forward to the knives, and when cut deliver it at the side of the machine. This machine has been very severely and successfully tested by practical farmers under very varying conditions.



RANSOMES AND SIMS' EIGHT-HORSE POWER PORTABLE HIGH-PRESSURE STEAM ENGINE.

8-HORSE POWER PORTABLE HIGH-PRESSURE STEAM ENGINE.

This engine is one of Ransomes & Sims' standard series of portable steam engines which are made from 3 to 20 horse power, and with single or double cylinders.

Portable steam engines are extremely simple, durable,

and easy to manage ; and are capable of application to all the requirements of a farm ; such as driving thrashing machines and all machinery for the preparation of food for stock, steam ploughing and tilling ; and also for working circular, horizontal, or vertical saws for cutting timber— for driving pumps for irrigation—millstones and mill

RANSOMES & SIMS, continued.

gear, quartz-crushing machines, stampers, amalgamators, &c. and are built for burning either wood or coal, a great desideratum in countries where coal is scarce.

The boiler, which is multitubular, is of the exhibitors' own make, and is constructed with especial reference to durability, on the same model as the most approved locomotive boilers. The bulk of the plates are Low Moor, the others being best Staffordshire iron. Ample water-space is given round the fire box, and between the tubes, for the free circulation of the water, the escape of steam, and the settling of sediment. The boiler is tested by hydraulic pressure to 100lbs. per square inch. It is fitted with a steam gauge, glass water-gauge, steam whistle, 2 gauge cocks, safety valve with spring balance, blow-off cock, &c. &c. and is lagged with wood covered with sheet-iron. It is fitted with a lock-up safety valve when so ordered.

The chimney is furnished with a wire top which extinguishes all sparks and prevents all danger of fire.

The crank shaft and connecting rods are of wrought-iron, and all small wearing parts are case-hardened.

The fly wheel is properly balanced, and can be hung on either end of the crank shaft.

The slide valve eccentric can readily be shifted to admit more or less steam, according to the amount of work to be performed, or to reverse the motion of the engine, if necessary.

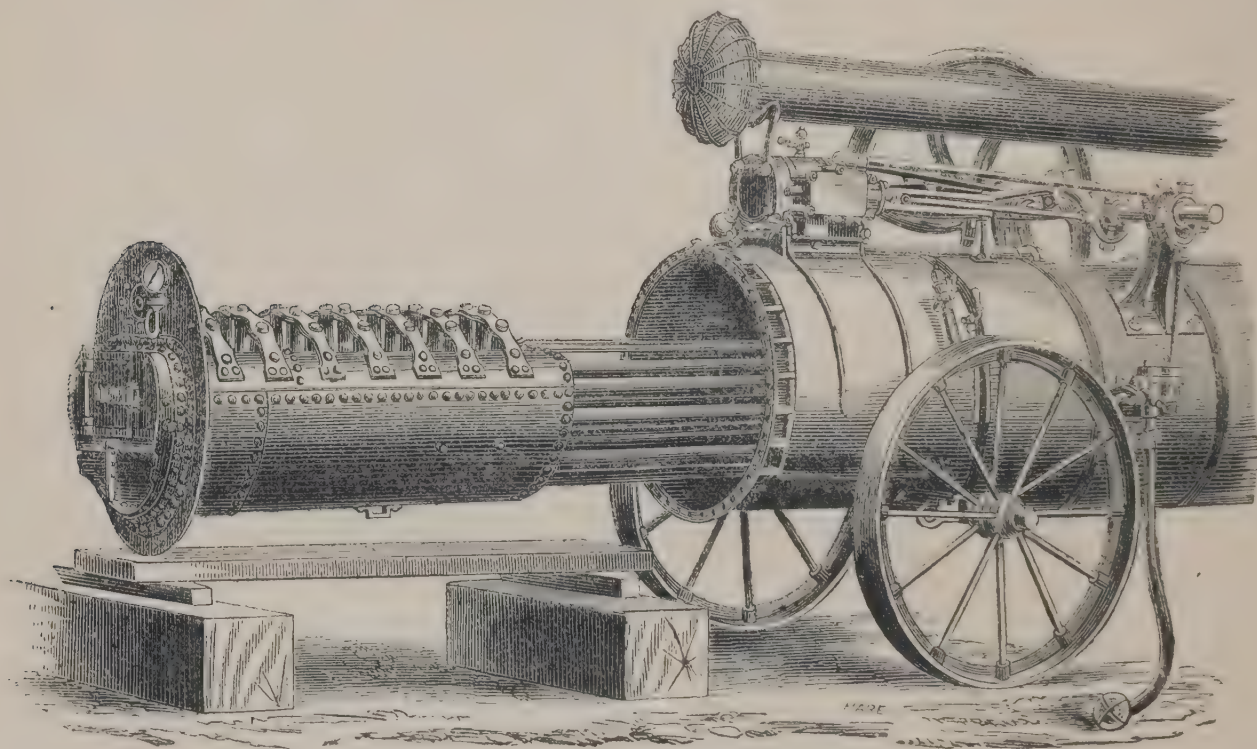
The power is calculated at 45lbs. pressure of steam in the boiler. Every engine is tested under steam before

leaving the factory, and may be safely worked at 60lbs. pressure, at which they give off double their nominal power, consuming, of course, fuel and water in the same increased proportion.

In estimating the power an engine will produce, the size of the cylinder is only one element, and by no means the most important, for it must be borne in mind, that the power really depends on the capability of the boiler to generate dry steam as fast as the engine can utilise it. In a portable engine the size of the boiler is limited by the condition that the engine must be easily portable, and these engines are furnished with as large boilers as is compatible with that condition. R. & S. have chosen a moderate sized cylinder and a quick speed, in preference to a larger cylinder and a slow speed, as possessing for this class of engine very many substantial advantages, and it will be found in practice that these engines will give off as much power, and cost as little to keep in repair, as any others of equal weight and portability, but furnished with larger cylinders.

These engines are all furnished with the following articles, viz. waterproof cover, tube brush, fire pricker, rake, shovel, screw spanners, oil can, large funnel, and spare gauge glass, which are included in the price quoted.

They are also sometimes fitted with a simple apparatus in the smoke box for heating the feed water. This economises the fuel considerably, and is not liable to get out of order.



RANSOMES AND SIMS' TEN-HORSE PORTABLE ENGINE WITH BIDDELL AND BALK'S PATENT BOILER.

A 10-HORSE POWER PORTABLE STEAM ENGINE, with Biddell & Balk's patent boiler. Biddell & Balk's patent boiler obtained the only prize which the Royal Agricultural Society offered for the best steam boiler in the year 1858.

These patent engines are made in various sizes from 5 to 14 horse power. They are suitable for every purpose to which a portable engine is usually applied, especially for steam cultivation and use in foreign countries where repairs are difficult. The patent boiler offers the greatest facilities for keeping the inside perfectly clean and free from mud, and thereby avoiding waste of fuel and risk of burning the plates. The boiler, as shown in the subjoined woodcut, is so constructed that the fire box, tubes, and tube plates, can be taken out all in one piece and put in again with facility. This is effected by using screws and bolts instead of rivets for the connexion of

the above-mentioned parts with the shell of the boiler, the surfaces making the steam-tight joints being faced.

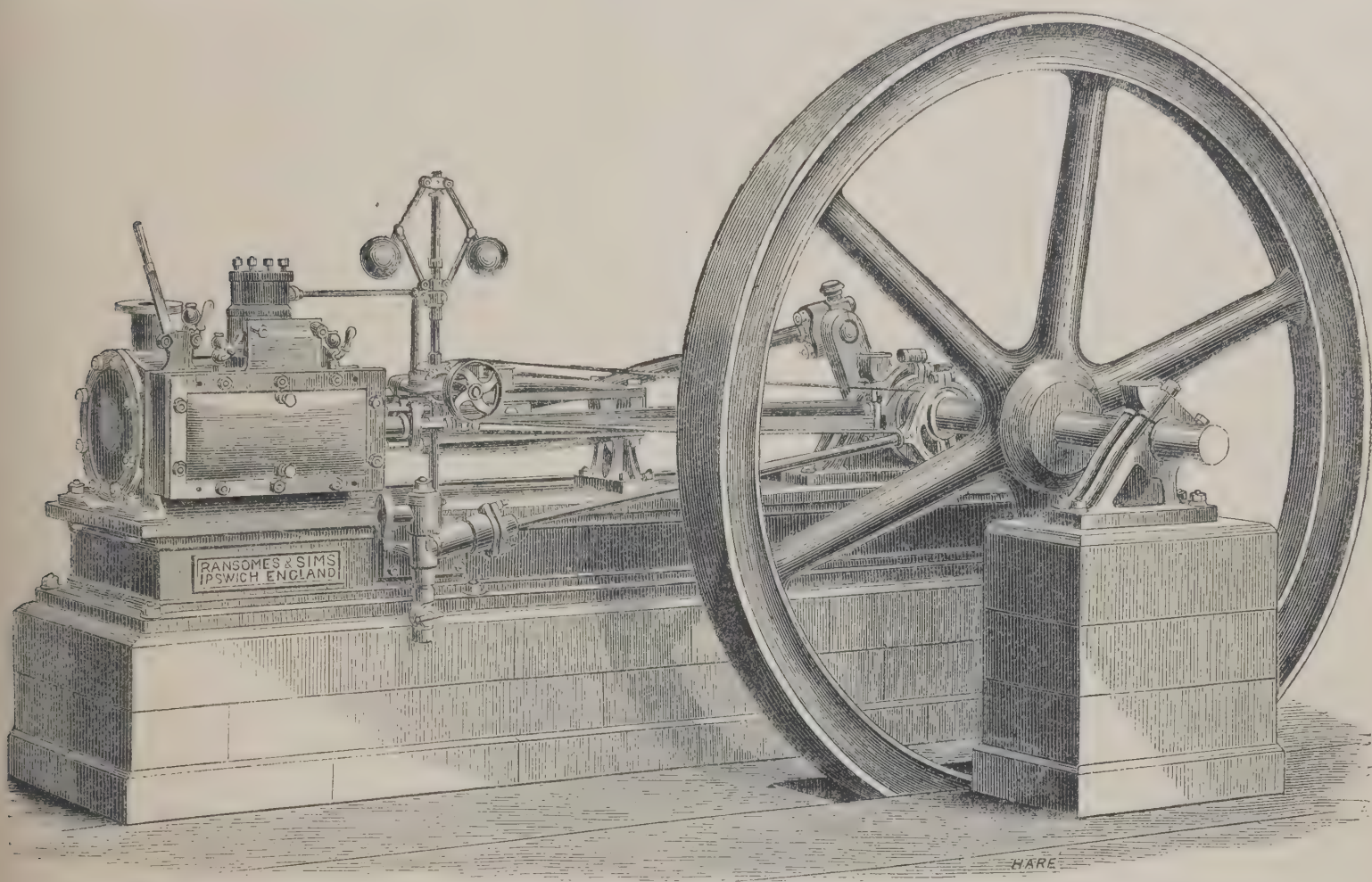
The great advantages of this boiler are, facility of cleaning, inspection, and repairs, so that when circumstances compel the use of bad water, the evil consequences of the same may be avoided by a frequent cleaning.

The exhibitors remark upon these boilers in comparison with the usual form of locomotive boilers,

"That the principal deposit takes place in parts of the boiler where it does the least amount of injury, and not in the parts immediately exposed to the action of the fire.

"That accurate experiments have shown a favourable result in point of economy of fuel, as compared with the ordinary boiler.

"That they are better adapted for burning wood, and
"That being higher above the ground they will travel better over rough roads."

RANSOMES & SIMS, *continued.*

RANSOMES AND SIMS' FIFTEEN-HORSE POWER HORIZONTAL STATIONARY HIGH-PRESSURE STEAM ENGINE.

A 15-HORSE POWER HORIZONTAL STATIONARY HIGH-PRESSURE STEAM ENGINE.

The above engraving represents one of Ransomes and Sims' standard series of high-pressure stationary engines, which are made in various sizes from 4 to 20 horse power, and which have been awarded the following important prizes, viz. :—

A prize of £10 awarded by the Royal Agricultural Society of England at the Lewes Meeting, 1852 ; the first prize of £20, by the same Society, at the Lincoln Meeting of 1854 ; and was again awarded the first prize of £20 at the Carlisle Meeting, 1855 (for the 8-horse power engine).

Prize, Paris Exhibition, 1856.

These engines are made of the best materials, and first-class workmanship. They are exceedingly simple in construction and compact in form. All the parts are easy of access, and afford every facility for adjustment or repairs. They are principally supported on a very strong cast-iron frame, and may be either erected on a stone or brick foundation, or be carried on two wood sills.

The crank shaft and connecting rod are of the best wrought-iron ; the slide valve is on the best principle ; the feed pump is very simple, and not liable to be put out of order ; there is a governor of the best construction for controlling the speed of the engine, and an improved regulating valve. The boiler is on the Cornish principle, and is perfectly safe and easy to manage ; the fire is placed in an internal circular flue, and the flame passes through and along each side of the boiler to the chimney. By this arrangement, all sediment contained in the water can collect underneath the fire-flue. The boiler is fitted with a good safety valve, glass water-gauge, and everything necessary for its safe and efficient working, and is very economical in the consumption of fuel. They may be fitted with lock-up safety valve if desired.

These engines are peculiarly adapted for driving fixed thrashing machines and barn machinery, or for sawing,

pumping, driving corn mills, or any other purpose for which steam power is required.

Engines of this construction are well adapted for grinding corn ; they can readily be attached to ordinary millstones in wind or water mills, and are, therefore, well worthy the attention of millers who may wish to ensure the means of grinding, at all times, with economy and regularity.

When economy of fuel is important these engines are furnished with an apparatus in the foundation plate for heating the feed-water, by which one-seventh of the fuel and one-tenth of the water that would otherwise be used are saved.

PORTABLE CORN MILL on iron frame, fitted with a pair of 24-in. French burr stones, the lower one of which runs.

This mill is suitable for grinding any substance to which millstones are usually applicable, and will perform its work more rapidly than the generality of such small mills.

PORTABLE CORN MILL on wood frame, fitted with a pair of 36-in. French burr stones and dressing apparatus.

This forms one of a series of portable corn mills comprising the following sizes:—30-in. 36-in. 42-in. and 48-in.

These mills are suitable for any purposes to which millstones are usually applied.

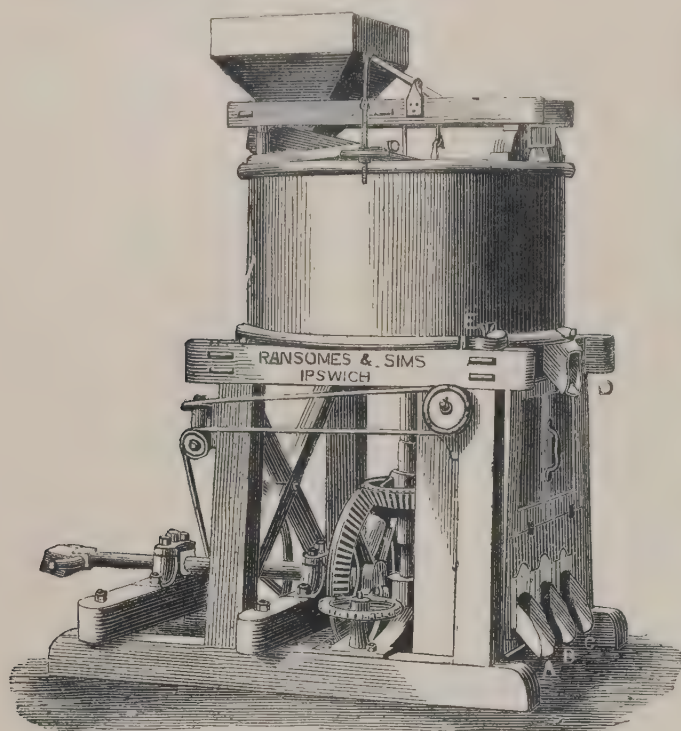
They consist of a pair of French or English millstones, mounted on a strong timber frame, as shown in the woodcut.

When fitted with French burr stones and a dressing apparatus, which can be neatly attached to the framework without adding to the bulk of the mill, they will produce the finest flour for household purposes.

For grinding barley-meal, bruising oats, or splitting beans, the English stones are quite sufficient, but French stones are preferable for producing fine flour, and much more durable.

RANSOMES & SIMS, *continued.*

When required for grinding Indian corn, it is recommended that the corn should be first split in a Biddell's patent bean cutter, which can be readily fixed on the top of the stone case. By this plan the stones wear much longer without dressing, and will grind faster.



RANSOMES AND SIMS' PORTABLE CORN MILL.

If so ordered, they can be fitted with a small crane for easily turning over the top stone when it requires dressing. They may be driven by means of a horse-gear, by a portable or fixed steam engine, or by water power.

PATENT COMBINED DOUBLE-BLAST STEAM THRASHING, RIDDLING, STRAW-SHAKING, WINNOWER, BARLEY AWNING, AND FINAL DRESSING MACHINE, marked A 1.

This machine is intended for thrashing wheat, rye, barley, oats, and other grain and dressing them ready for market, which operations it performs in the best manner. The drum is 54 in. clear width, and is fitted with patent reversible wrought-iron beaters, which do not break or injure the grain, and which will thrash barley so that it will malt perfectly. The grain is fed into the machine longitudinally, so that the straw is not bent in thrashing, and consequently it leaves the machine without being injured. After the corn has passed through the drum, the straw is carried into the patent shaker, in which part this machine radically differs from any other yet brought out. The objects to be obtained by a good shaker are threefold:—

1st. To separate the straw so that any grain remaining in it may be retained in the machine.

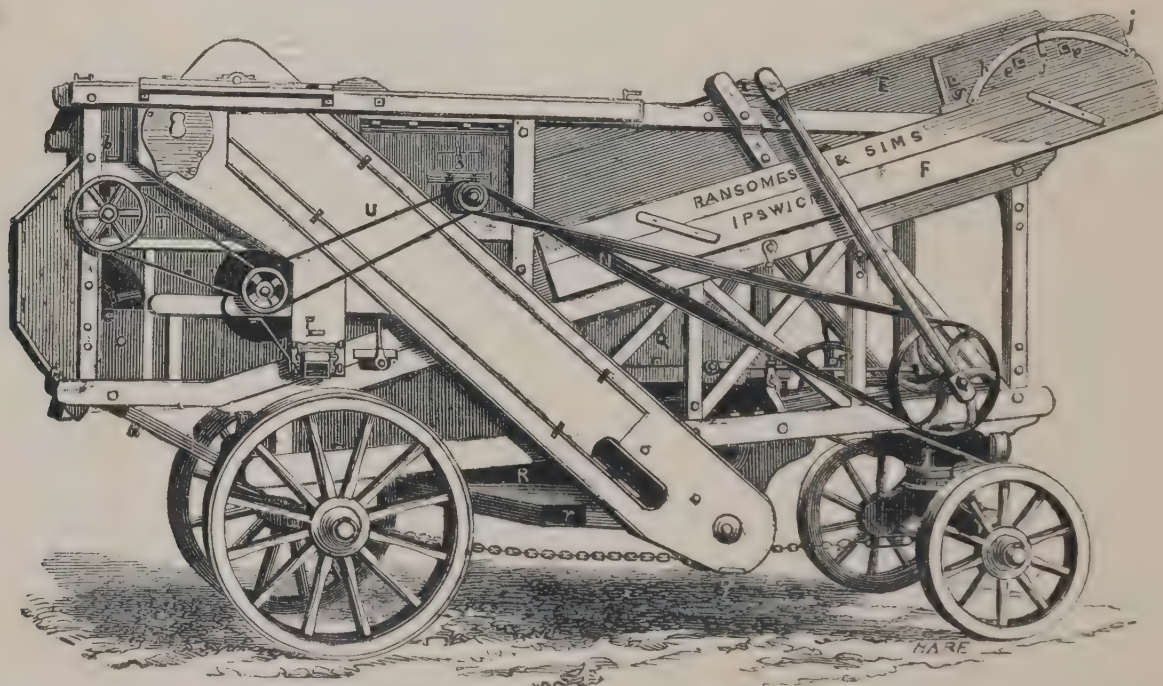
2d. To carry back the grain and short straws thus separated to the dressing part of the machine.

3d. To carry away the straw so that it may be easily removed from the tail of the machine.

The old reciprocating or crank shakers only accomplish the first and third of these requirements, and that at a great expense of power and wear and tear. To accomplish the second desideratum, additional apparatus is necessary, which generally consists of heavy reciprocating riddles set at an angle under the shaker, or some other equally cumbrous contrivance.

The patent rotary shaker with which these machines are fitted, accomplishes the above three requirements in a perfectly satisfactory manner.

The rollers are so placed that the spikes of one roller nearly touch the circumference of the adjacent rollers, and also the board which forms the bottom of the shaker. The rollers revolve at equal speed, so that as the straw leaves the drum it is shaken continually in a jerking



RANSOMES AND SIMS' PATENT COMBINED DOUBLE-BLAST STEAM THRASHING, RIDDLING, STRAW-SHAKING, WINNOWER, BARLEY-AWNING, AND FINAL DRESSING MACHINE.

manner, which exactly resembles the action of hand-shaking by means of a fork. The spikes on the rollers nearly touching the bottom board of the shaker, all the short straws and grain are helped back at each revolution of the shaker towards the riddling apparatus. As there is no reciprocating movement about the shaker, the power required to work it is very small, and as the riddling apparatus is, by the shaker, so much relieved from the work which it usually has to do, it also is very light,

and requires but small power to drive it, whilst the wear and tear are consequently reduced to the lowest point. A series of riddles is arranged in the machine; their use is to sift the straws and ears from the grain and chaff; and they differ in size of mesh to be used according to the grain to be thrashed. Whilst the corn is passing through the riddling apparatus, it is subjected to a blast produced by the fan, and this blast is made stronger or weaker by opening or closing the doors at the ends of

RANSOMES & SIMS, *continued.*

the fan box. The chaff is blown towards the back of the machine. After the thrashed grain has passed through the riddles, the clean corn is carried down to the elevator bottom, whence it is carried up by the elevators, dropped into the barley awner through which it passes into a chob-cleaner or white-coater, which effectually strips the husk from the kernels to which it may still be adhering. If the drum and concave are properly set, this machine leaves very few chobs or unthrashed ears.

The grain then passes over the sieves, which are arranged as in a common dressing-machine, and is simultaneously operated upon by a blast which removes all the dust, dirt, and seeds, and leaves the grain perfectly bright and clean.

It next passes into the patent adjustable rotary screen, which separates the thin kernels from the best corn, and leaves the sample ready for market, dressed in a better manner than it could have been done by hand.

It will be evident that a machine which has to finish wheats of different kinds and sizes of kernels, also oats, barley, rye, &c. and take out from the bulk the light corn, must either be furnished with several screens, or its one screen must be capable of considerable and ready adjustment. After much consideration, R. & S. have succeeded in producing and patenting a screen which may be readily and quickly adjusted to suit different kinds of grain, and which, by a simple arrangement is self-cleaning, so that it never can become blocked up by the grain lodging between the wires.

By means of this screen two separations are made, viz. good corn and light or chicken corn. The amount of distance between the wires is regulated at pleasure, so that the owner of the machine, or the person who has hired it, can set it to take out as much or as little tail corn as he pleases.

The A 1 machines are all fitted with this screen, and the advantage which it gives them over the old plan, of having a separate screen for each kind of grain, is very great.

This machine may also be fitted with a patent apparatus (carried on the same framework), by which the straw, as it leaves the machine, may without any manual labour at the machine be carried to any convenient distance, within a limit of 50 feet, and formed into a stack not exceeding 27 feet in height.

These machines are made in several sizes, all of which stand in the first rank for simplicity, durability, economy

of power in proportion to the work done, and excellence in all the operations which they profess to perform. In order to meet the rapidly increasing demand for these articles, Ransomes and Sims have recently erected a costly series of tools for preparing all the woodwork for them, so that the whole machine is constructed with an accuracy and solidity entirely unattainable by hand-work, and as only thoroughly seasoned wood and the best materials are used, the utmost durability is thus ensured.

These machines are sold at the lowest prices which are compatible with the above qualifications, and Ransomes & Sims desire to draw attention to the fact that the customer has their reputation to guarantee the excellence of their machines, for they cannot afford to send out any which are not in every respect of the first class; also, that so-called cheap machinery can in general only be produced by the use of inferior material and unsound workmanship, and speedily shows itself to be the most expensive, often entailing on the unfortunate purchaser a permanent outlay and annoyance.

These machines have been awarded prizes and medals as follow :—

At the great trial of thrashing machines by the Agricultural Society of Belgium, during the second week of April, 1858, at Brussels, to the No. 1 and also to the A 1 machine, a special prize, grand gold medal of honour.

At Vienna, 1857, a gold medal.

At Pesth, 1857, the highest diploma of merit awarded.

At Amsterdam, 1857, a gold medal.

At Paris, 1856, a first-class gold medal and 300 francs.

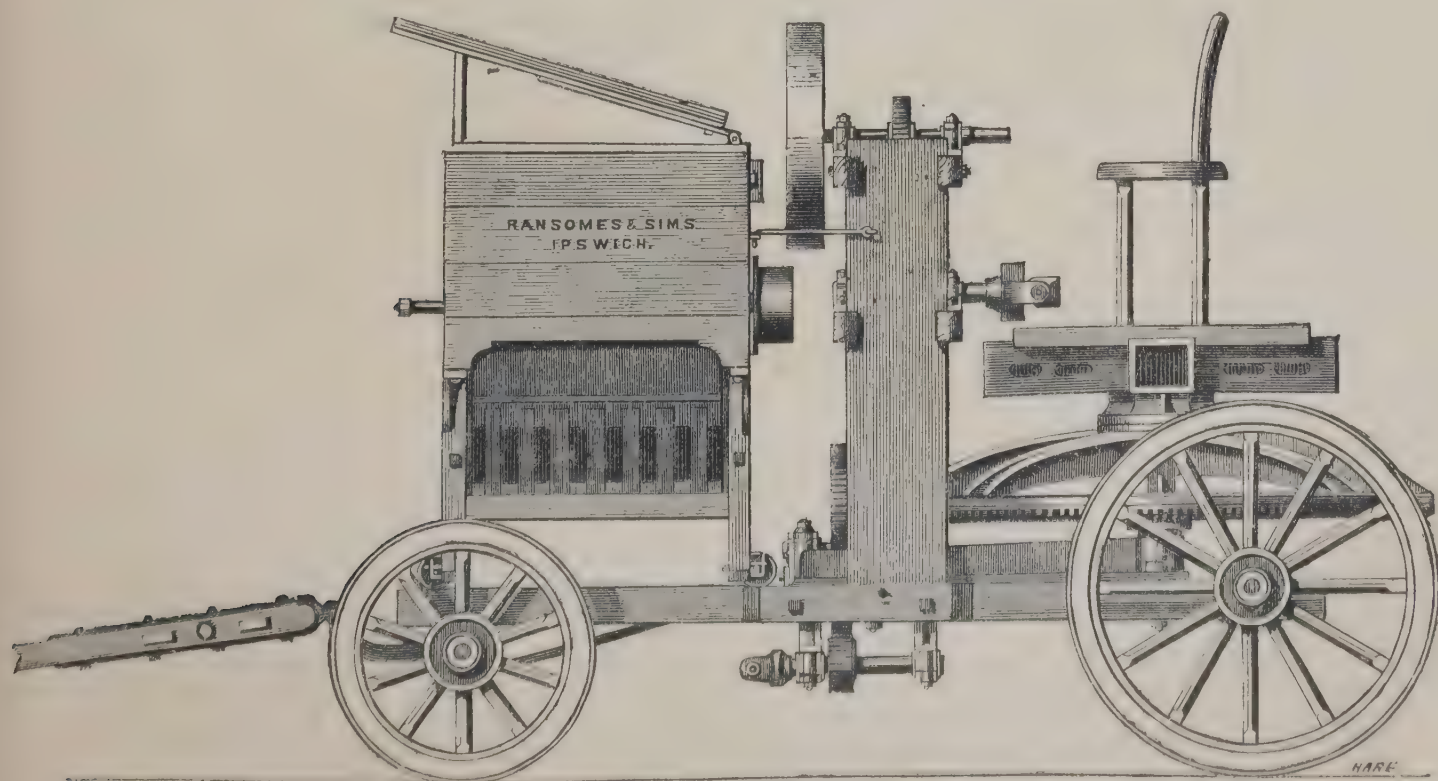
At Rotterdam, 1858, first-class gold medal.

At St. Petersburg, 1860, a gold medal.

At Schwerin, 1862, from the German Landowners' Union, the gold medal of honour.

PATENT COMBINED DOUBLE-BLAST STEAM THRASHING, RIDDLING, STRAW SHAKING, WINNOWER, AND BARLEY AWNING MACHINE, marked B 1.

This machine is similar in its general construction to the A 1 previously described, but it has no screen. Except the final screening, it performs the same operations as the A 1, and is strongly recommended in all cases where screening is not absolutely necessary.



RANSOMES AND SIMS' IMPROVED PORTABLE THRASHING MACHINE.

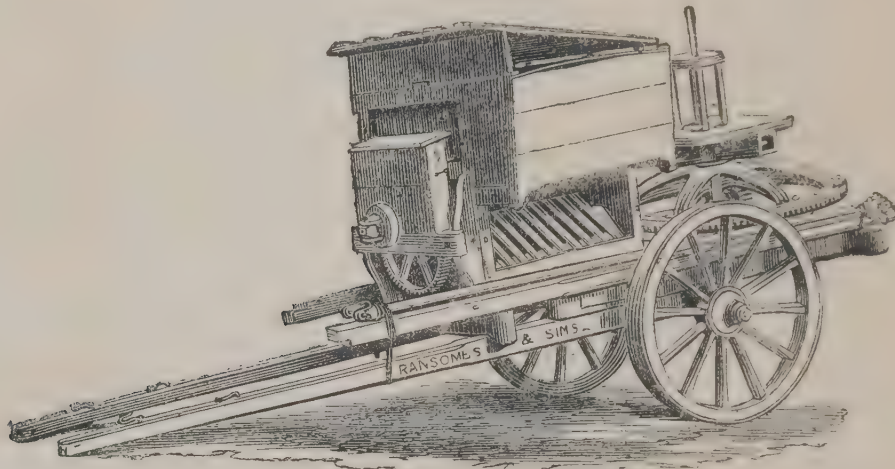
RANSOMES & SIMS, *continued.*

IMPROVED PORTABLE THRASHING MACHINE, suitable to be worked by horses or oxen without unloading the horse-works, as shown on page 85.

This machine thrashes various kinds of grain perfectly and without injury, leaving the grain and chaff together. The barn-work or thrashing part only requires to be unloaded; the driving gear remaining upon the 4-wheel

carriage around which the horses walk. The grain when thrashed is dressed by hand at any convenient period. From its simplicity and the facility with which it can be transported and used, this machine is well adapted for mountainous and other countries where repairs are difficult and the roads bad.

The exhibitors also manufacture portable horse-power



PORTABLE HORSE-POWER THRASHING MACHINE.

thrashing machines mounted on 2-wheel carriages, as shown in woodcut.

Before using these machines the horse gear and thrashing drum must be both unloaded and fixed as below.

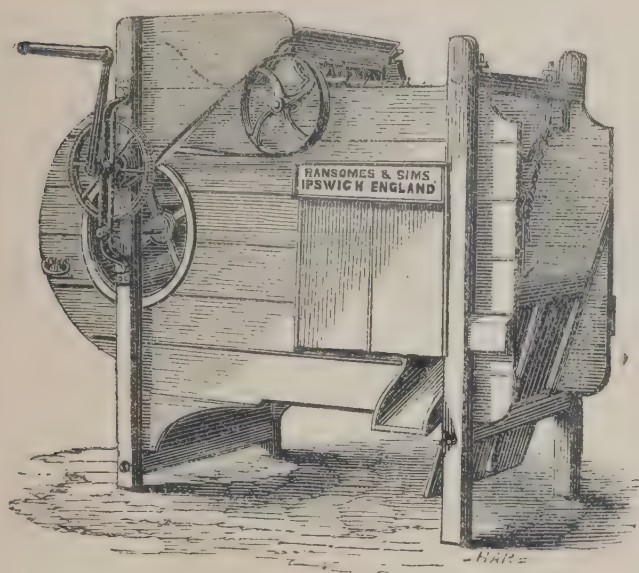


These machines are also made to drive with a strap through an intermediate motion. The annexed drawing

represents one on this construction as fixed for work, and with a winnowing machine attached.

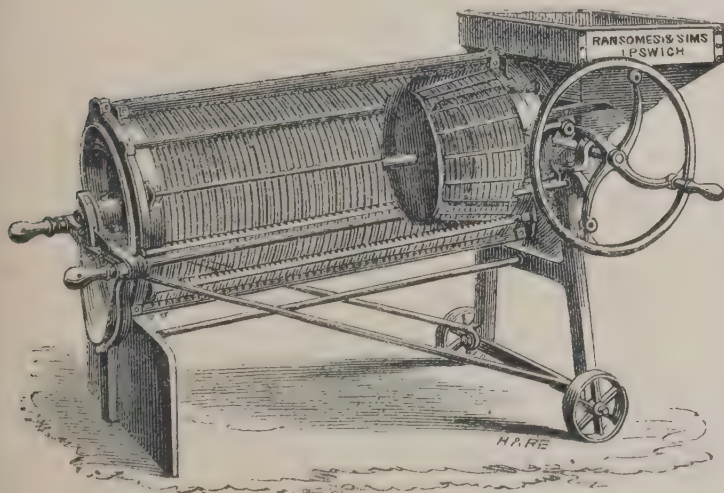


RANSOMES & SIMS, *continued.*



NEW PATTERN DRESSING MACHINE, No. 3.

This machine is fitted with a spiked roller. It will dress rough grain just as it comes from thrashing machines which have no riddle or blower. By throwing off the strap, lifting out the spiked roller, closing the toothed plate, through which it works, with an iron cover, and changing the sieves, the machine is prepared for dressing grain as usually delivered from the single-blast steam thrashing machine. By setting the machine as above, but taking out all the sieves, it may be used as a blower or as a malt screen. Extra sieves for seed dressing are sent when ordered, and when they are used the screen must be closed.



PATENT SELF-CLEANING AND ADJUSTABLE ROTARY SCREEN, with stone separator.

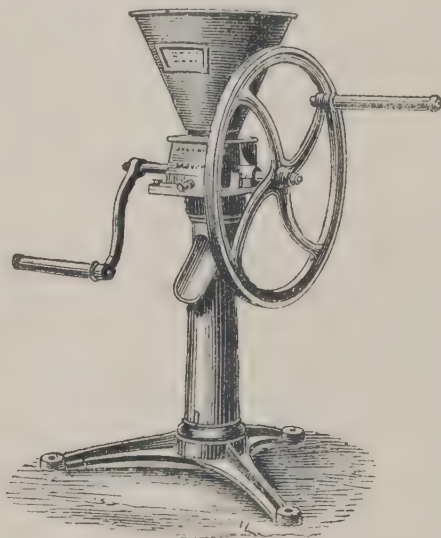
This machine will separate thin and light grain from a sample of barley, wheat, &c. making a perfect sample without leaving good grain with the tail.

The distances between the wires can be altered, so that more or less light grain may be removed as desired, and the screen is therefore equally applicable to grain grown on different soils, or in different climates or seasons.

This screen is perfectly self-cleaning, so that it is always equally effective. It has no brushes either inside or outside, nor any washers or cleaners passing between the wires, and is therefore free from the objections to which screens so constructed are liable in wear.

The action of this screen is continuous. It is therefore subjected to less strain in working, and requires less power, than those in which the action is backwards and forwards.

To merchants and maltsters this screen is invaluable, being from its adjustability applicable to foreign as well as home-grown barley, and for one season's growth as well as another. To farmers it is also invaluable, enabling them so to dress their barley that it shall command the highest price, and to use for feeding purposes the light corn, which, if not separated, would lower the value of the whole sample.



BIDDELL'S PATENT BEAN CUTTER, for splitting hard or soft beans, peas, and Indian corn.

Obtained the silver medal of the Royal Agricultural Society at Gloucester; the silver medal of the Yorkshire Agricultural Society at York, 1853; and a second-class medal at a meeting of the Royal Agricultural Improvement Society of Ireland, at Killarney, 1853.

It is well known that neither solid-roller mills nor mill-stones will split beans unless they are in good condition, on account of their sticky nature when damp. A stone or other foreign substance passing into a solid-roller mill generally damages the rollers, which are costly and difficult to repair.

In Biddell's patent bean cutter these defects are entirely remedied. The barrel or cutting roller is hollow, and is formed by a number of separate triangular steel cutters, arranged around the circumference of two end rings, and so set that there is more clearance at their back than at the cutting edge, therefore the mill can never choke, no matter what may be the size or condition of the beans. Each tooth has three separate cutting edges, which can be successively used, and when all are worn out they may be easily replaced with new teeth by an ordinary labourer at a very small cost, viz. 7s. 6d. for a complete set. The amount to which the beans are crushed is governed by a screw, and care must be taken not to set the cutting plate so close that it touches the barrel.

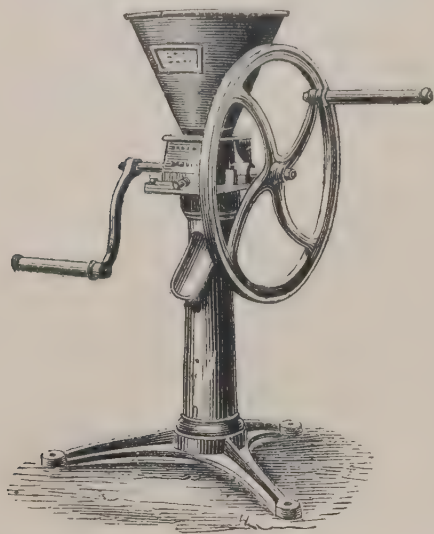
They are also well adapted for cracking peas or Indian corn, and have been successfully applied over a pair of stones for cracking the Indian corn before grinding, which enables the stones to do their work more quickly, and with less power. For this use they are mounted over the stone box, and the split corn passes from the bean cutter spout into the hopper of the corn mill.

They are made in two sizes, No. 1 and No. 2, and are mounted on column, as shown in woodcut, or on a bracket.

With the No. 1 mill one man can cut 3 bushels of beans per hour; two men, 5 bushels per hour. If driven by horse or steam-power, at a speed of 150 revolutions per minute, it will cut 24 bushels per hour.

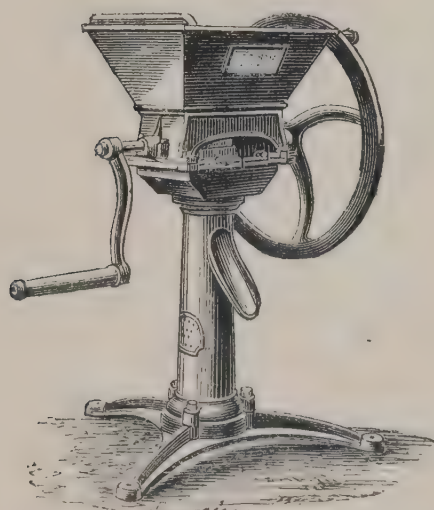
The No. 2 mill, which is extra strong, and with brass bearings for power only, when driven at 150 revolutions per minute, will cut from 25 to 30 bushels of beans per hour.

RANSOMES & SIMS, *continued.*



BIDDELL'S NEW PATENT STEEL OAT MILL.

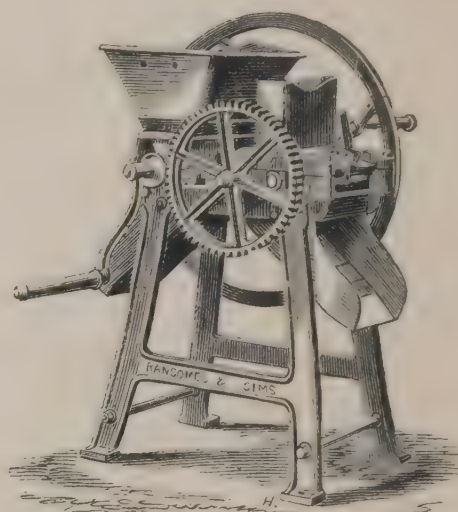
In Biddell's patent oat mill, the roller has the cutting edge formed of pure steel, supported at the back by cast-iron. This enables us to harden the steel as much as can be done by fire and water, for the cast-iron not being susceptible of hardening by the same process, we get the toughness of the soft material supporting the keen cutting edge of the harder metal. Thus a very durable and excellent article is produced, and at a cheaper rate than could be done by the old process of making the cutting barrels of wrought-iron, and then case-hardening them, an operation which was attended with much risk and expense. The other process, of making them of cast-iron and case-hardening them, produced an apparently good article, but a very worthless one really, as the hardening was only skin-deep, and soon wore away.



PATENT COMBINED STEEL MILL for beans and oats, on iron stand, No. 10.

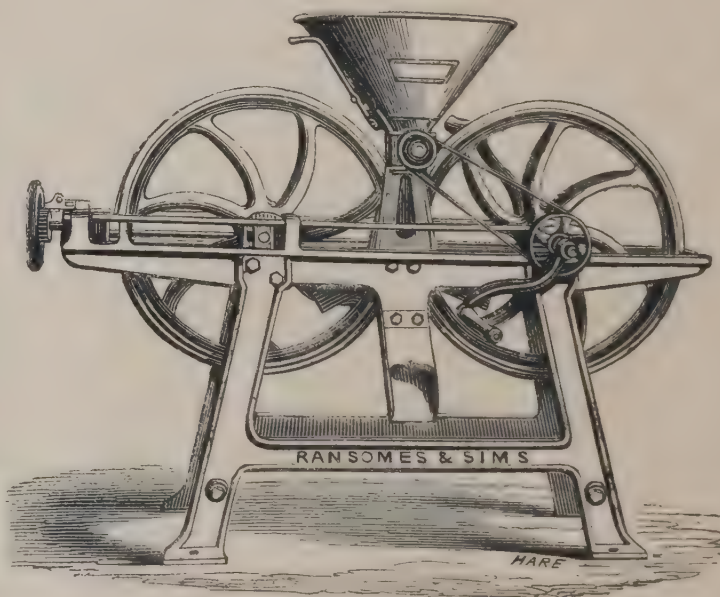
The combined mills consist of the working parts of the above mills mounted on the same spindle and frame, by which the efficiency of each mill is maintained, but the cost of two frames is saved, and the space occupied is also less.

Some thousands of these patent mills are in use, and giving the greatest satisfaction.



PATENT COMBINED BEAN AND OAT MILL, AND OIL-CAKE BREAKER, No. 17.

This mill consists of three distinct mills on one frame, viz. a Biddell's patent bean mill which will cut and crush about 3 bushels of beans per hour; a Biddell's patent oat mill, adapted for cutting and crushing from 3 to 5 bushels of oats per hour; and a No. 4 oil cake breaker, for breaking and screening linseed or rape cake.



BIDDELL'S PATENT UNIVERSAL MILL, No 18.

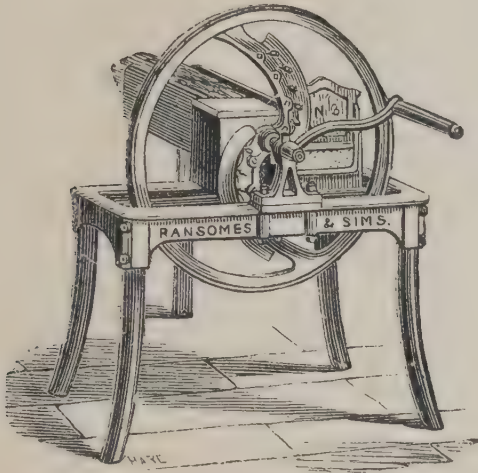
This mill forms one of a series, and consists of a smooth-roller bruising mill and a Biddell's patent bean cutter mounted upon the same frame, and which may be used simultaneously or separately at pleasure.

The smooth-roller mill is intended for bruising oats, linseed, malt, or barley. It consists of two cast-iron rollers of equal diameters and widths, mounted on a strong frame, and to do the same work requires *less power* than those which are constructed with one *large* and one *small* wheel, which was proved by the trial before the Royal Agricultural Society at Chester, in 1858, where one of these mills, in competition with all the best mills on

RANSOMES & SIMS, *continued.*

that construction, was awarded the first prize as the best oat and linseed crusher.

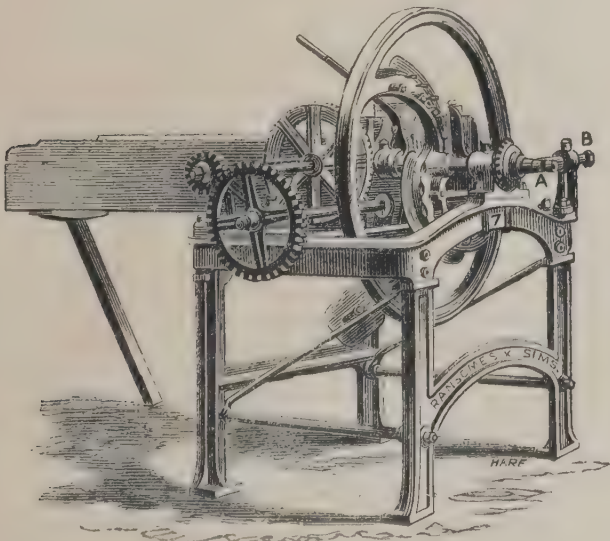
The patent bean cutter is intended for breaking beans, peas, Indian corn, &c. They are made of various sizes, and suitable for hand, horse, steam, or water power.



BIDDELL'S PATENT CAM CHAFF CUTTER, No. 3.

This chaff cutter obtained the first prize of the Royal Agricultural Society of England, at Chester, in 1858, as the best chaff cutter for hand power.

This machine is fitted on iron frame with wrought legs, and cuts two lengths of chaff, $\frac{5}{16}$ in. and $\frac{3}{8}$ in. It is adapted to cut a large amount of chaff with but little consumption of power.



UNIVERSAL CHAFF CUTTER, No. 7, with rising and falling rollers, for hand, horse, steam, or water power.

This machine may be worked by one man, with handle at A; by two men, with handles at A and B; by horse or steam power, through a crotch or pulley on spindle A.

It is simple in construction, and not liable to get out of order. Except the wood feeding trough, it consists entirely of metal.

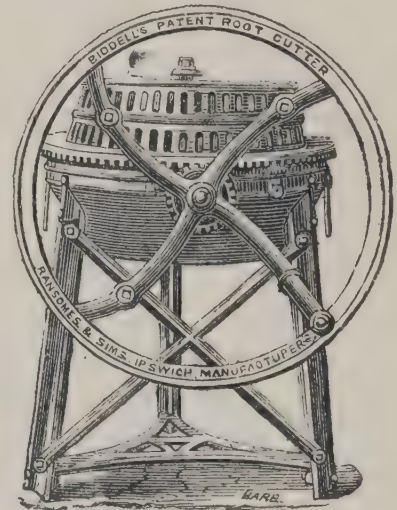
The knives are as easily sharpened and set as in an ordinary chaff cutter.

This machine is furnished with a patent lever for instantly stopping the rollers, in case the hand of the feeder should be drawn in. The few cog wheels in this machine are cased over, so that no danger can arise from them.

It cuts two different lengths, viz. $\frac{1}{2}$ in. and $\frac{1}{4}$ in. or a greater variety if so ordered.

Of $\frac{1}{2}$ -in. chaff one man will cut about 3 cwt. of hay, two men 5 cwt. one horse 10 cwt. per hour.

This machine will cut any substance to which machines of this class are usually applied, such as hay, straw, clover, hop-bines, sorghum, cane trash, &c.



BIDDELL'S NEW PATENT ROOT CUTTERS.

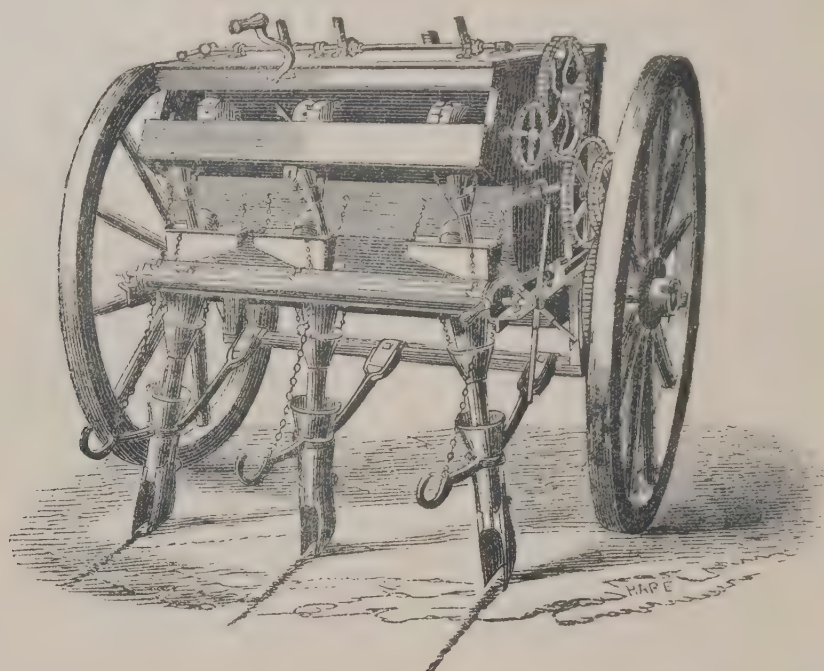
One of these machines obtained the first prize of the Royal Agricultural Society of England at Chester, in 1858.

They are made in different sizes, and to cut roots either into slices for beasts, into finger-pieces for sheep, or into thin shreds for fermenting.

This machine is fitted with knives for cutting slices $\frac{5}{8}$ in. thick, the entire width of the root. It is also fitted with cross-knives, which are easily thrown in and out of work, and which cut finger-pieces $\frac{3}{4}$ in. wide and $\frac{5}{8}$ in. thick.

They effectually cut the last piece. The roots do not hang up as in other machines. The hopper is divided into three parts, so that by filling one or all, the machines may be worked either by a boy or a man as is most convenient.

REEVES, ROBERT & JOHN, *Bratton, Westbury, Wilts.*—Liquid manure drills, manure distributors, patent corn manure, and turnip drills, &c.



PATENT LIQUID-MANURE AND SEED DRILL.

PATENT LIQUID-MANURE AND SEED DRILL. Invented by Thomas Chandler of Aldbourne, and manufactured by the exhibitors. This drill has received 42 prizes from the Royal Agricultural and other societies, including the first prize at the Royal Agricultural Show at Leeds, 1861; first prize and gold medal at the Paris Universal Exhibition, 1856; and prize medal at the great International Exhibition of England, 1851. Price £25 0

CHAMBER'S PATENT DROP LEVER, manufactured by the exhibitors, for dropping liquid manure and seed in bunches. Price £2 10

A 7-ROW SMALL OCCUPATION CORN DRILL. This drill is suitable for small light land farms. It will sow all kinds of grain and seed. Price £14 10

PATENT MANURÉ AND SEED DRILL for sowing manure with mangolds and turnips, invented and manufactured by the exhibitors. This drill received the prize at the Royal Agricultural Show at Leeds, 1861. It is suitable for drilling general compost manure, or for artificial manure in its pure state, from 3 to 60 bushels per acre. Price £16 0

PATENT ECONOMICAL MANURE AND SEED DRILL, invented and manufactured by the exhibitors.

This drill has received the following prizes during the last 5 years:—

First prize at the Bath and West of England Show at Newton, 1857.

Silver medal at the Royal Agricultural Society of England's Show at Salisbury, 1857.

The prize at the North Lincolnshire Show at Louth, 1857.

First prize at the Bath and West of England Show at Cardiff, 1858.

First prize at the Yorkshire Show at Hull, 1859.

First prize at the Highland Agricultural Show at Edinburgh, 1859.

First prize at the Highland Agricultural Show at Dumfries, 1860.

A prize at the Royal Agricultural Show at Leeds, 1861; and the first prize at the Highland Agricultural Show at Perth, 1861.

It is adapted for sowing artificial manures in their pure state, from 2 to 20 bushels per acre on the ridge.

Price £12 0

PATENT BROADCAST MANURE DISTRIBUTOR, invented and manufactured by the exhibitors. This machine has received 11 first prizes during the last 5 years, by the Royal Agricultural and other societies, to the amount of £54; it also received the first prize or honourable acknowledgment at the German Farmers' and Foresters' Show at Schwerin, 1861. Price £10 0

PATENT THISTLE DESTROYER, for killing thistles or other perpetual weeds, invented and manufactured by the exhibitors. It obtained a silver medal at the Royal Agricultural Society of England, at Leeds, 1861. This is a simple implement, used the same as a common spud or weeding paddle, which, at the same time as it is pushed into the ground to cut off the weed, discharges a portion of salt on the bleeding root. The salt thus penetrating the roots will effectually destroy them.

Price 10s. 0d.

PATENT COMBINED ARTIFICIAL MANURE DRILL & HORSE HOE, invented by H. & T. Proctor of Bristol, and manufactured by the exhibitors. This implement is adapted for hoeing the plants and, at the same time, to deposit a small portion of suitable manure to carry out the growth of the plant in its last stages.

R. & J. R. can with confidence recommend the above class of implements, having received during the last month a large number of testimonials as to the efficiency of their patent manure drills and manure distributors, which they will be happy to forward post-free on application.

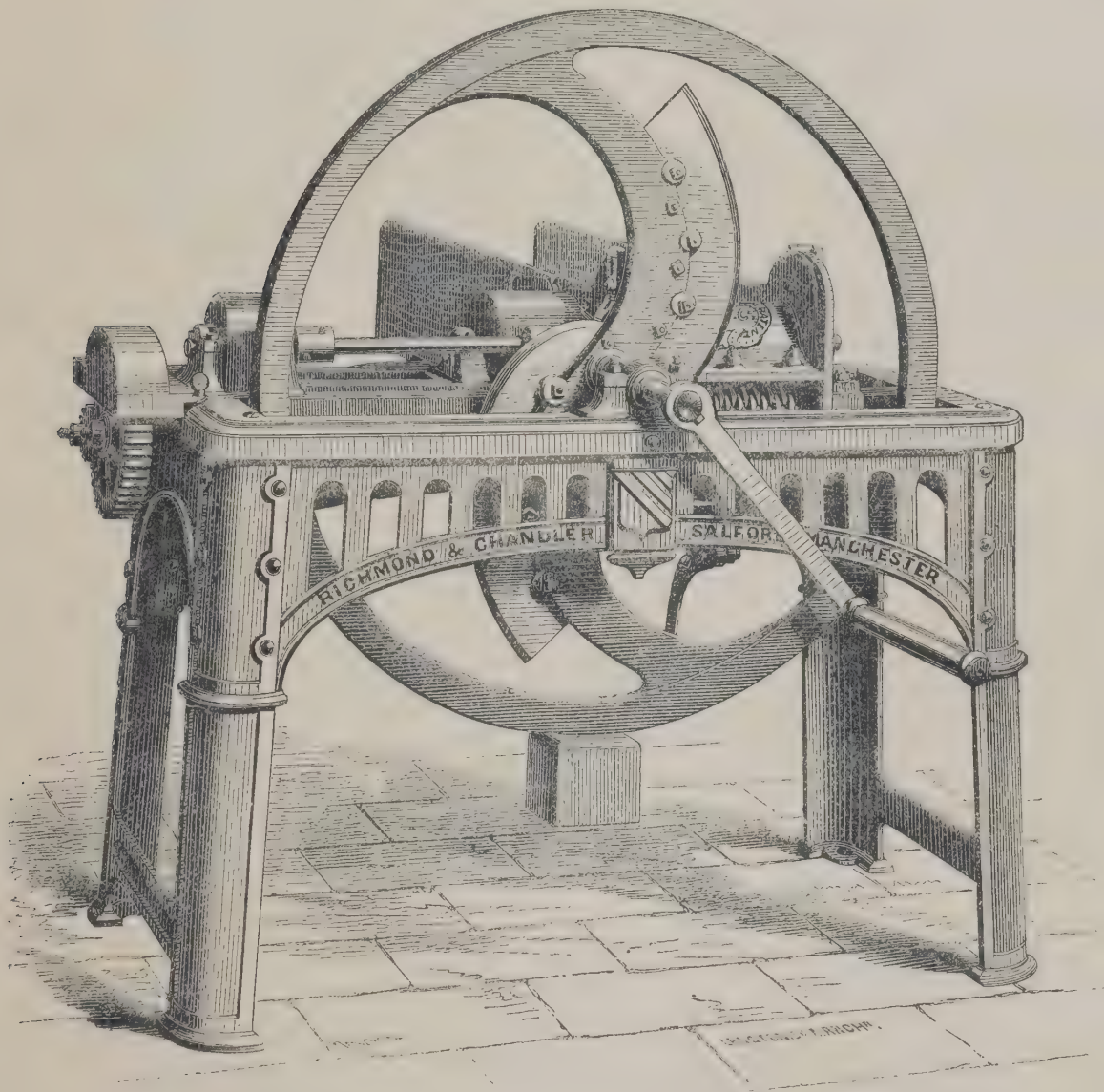
[2171]

RICHMOND & CHANDLER, Salford, Manchester.—Chaff cutters and machinery for the preparation of food for cattle, &c.

The long experience of Richmond & Chandler in the manufacture of chaff cutters, corn crushers, &c. enables them to produce machines of a superior construction and style of workmanship at as low prices as any house in the trade. The chaff cutters have for years taken the prize of the Royal Society of England, also the Societies of Ireland, Scotland, France, Holland, Russia, and elsewhere ; they are fitted with toothed rollers,

rising mouths, stop motion, and the patent steel mouth-piece, which being harder than the knives, prevents their constant friction wearing it hollow or uneven.

These machines are thus described in Stephen's Book of Farm Implements and Machines, edited by R. S. Burn:—"The admirable workmanship which characterises these unrivalled machines may be cited as a good example of what agricultural mechanism ought in all cases to be."



CHAFF CUTTER.

CHAFF CUTTERS.

No. 58	£2 10
No. 57	3 15
No. 1A	4 10
No. 59	5 10
No. 3C	7 0
No. 4	10 0
No. 5	15 0
No. 6	16 0
No. 7	20 0

CORN CRUSHERS.,

No. 1	5 5
No. 2	6 10

No. 3	10 0
No. 4	14 0
No. 5	24 0

TURNIP CUTTERS.

No. 1	3 0
No. 2	4 10

STEAMING APPARATUS.

Price £6 9s. to	16 4
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BREAD KNEADING MACHINES.

Price £5 to	50 0
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Catalogues may be obtained free on application.

[2172]

ROBEY & Co. *Lincoln*.—Ten-horse double-cylindrical traction engine, and double-blast thrashing machine.



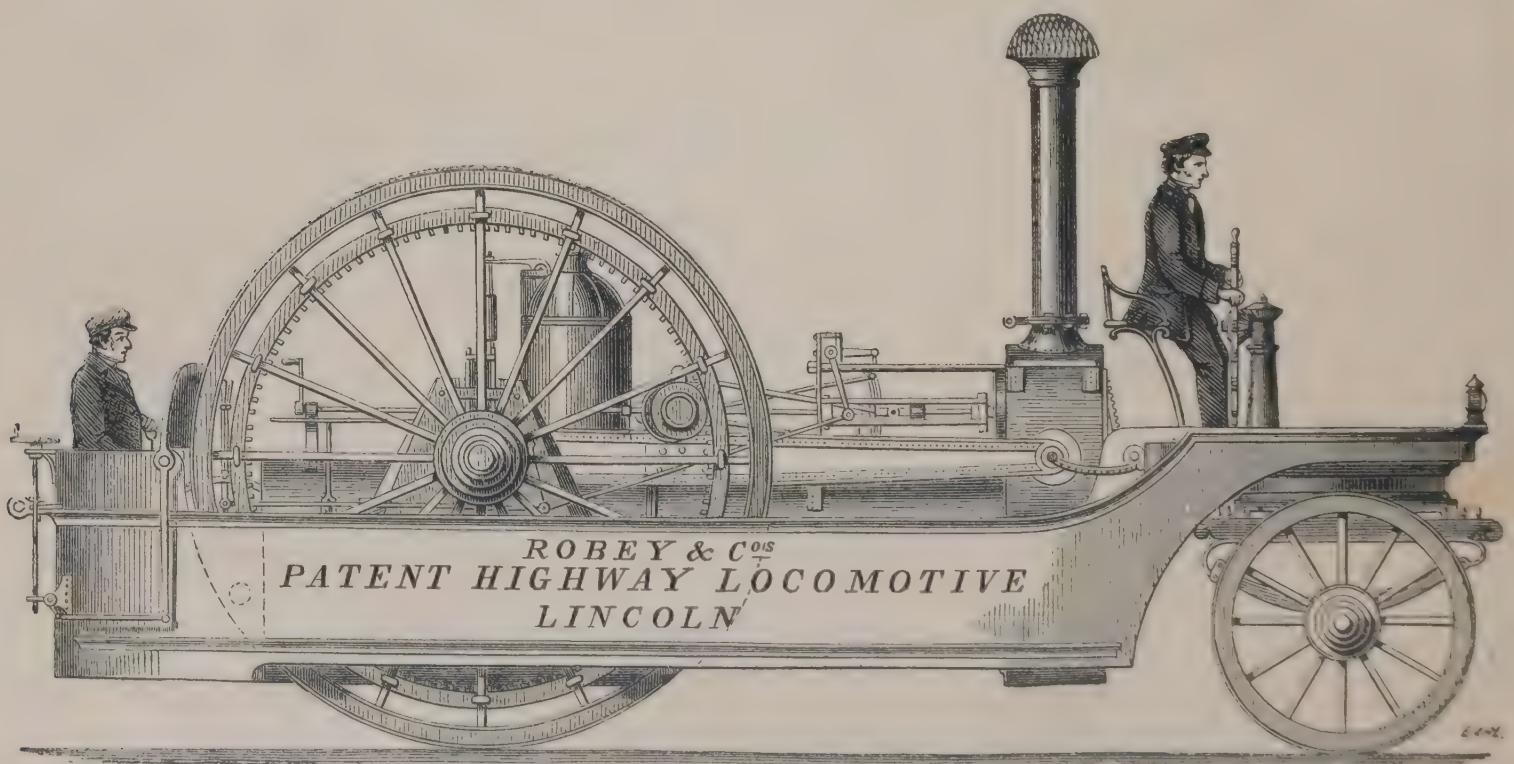
TRACTION ENGINE.

The above wood-cut represents one of Robey & Co.'s double-cylinder patent traction engines, and a No. 1 finishing machine, as they appear when travelling from one place to another.

Manufacturers of portable and fixed steam engines, patent steam ploughing tackle, traction engines, thrashing machines, corn mills, saw benches, &c. &c. Descriptive, illustrated, and priced catalogues free by post.

MESSRS. R. & Co.'s 10-HORSE DOUBLE-CYLINDERED TRACTION ENGINE can be used for all agricultural purposes, and when required to be moved from farm to farm, will take a thrashing machine or any other agricultural implement, without horses.

The silver medal was awarded to R. & Co. for their ploughing and general purpose engine at the Royal Show held at Leeds, 1861.



PATENT HIGHWAY LOCOMOTIVE.

[2173]

ROWLEY, J. JEPHSON, *Rowthorne, Chesterfield*.—Hedge clipping machine, combining a grass mower and manual delivery reaper.

[2174]

ROWSSELL, SAMUEL, *Buckland St. Mary, near Chard, Somerset*.—Patent tubular-iron horse rake (American) ; field and entrance gates.

[2175]

RUSTON, PROCTER & Co., *Lincoln*.—Eight-horse power portable engine, and combined finishing and thrashing machine (*See page 94*).

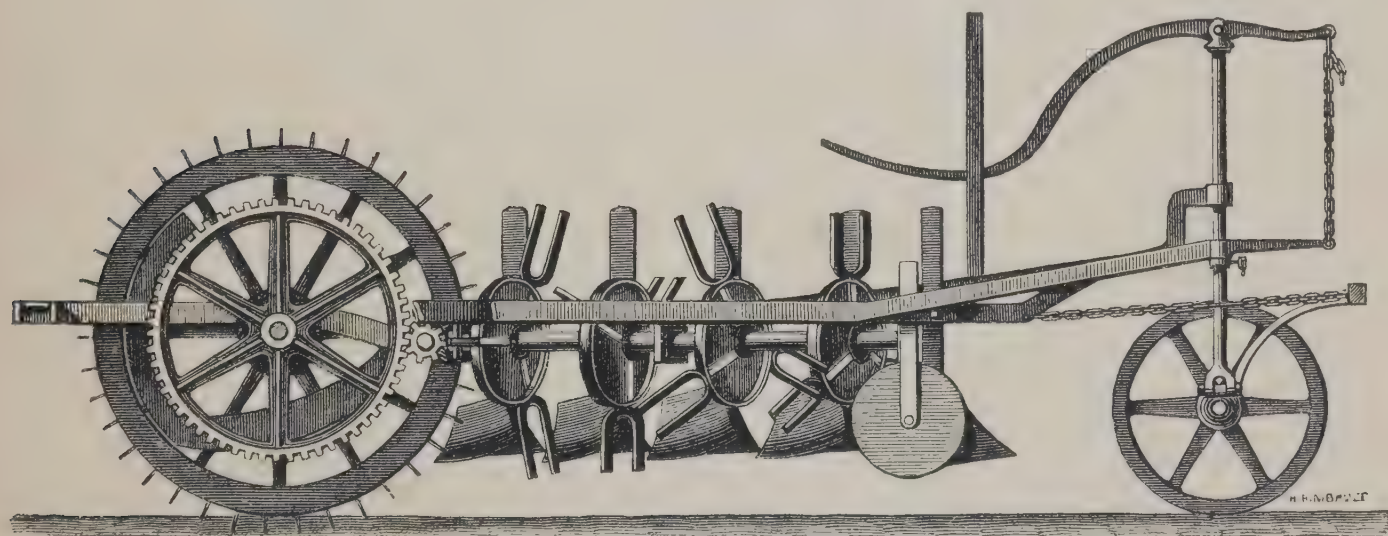
[2176]

ST. PANCRAS IRON WORK COMPANY, THE, *Old St. Pancras Road, London, N.W.*—A conservatory, and glass walls.

[2177]

SAMSON & JEWELL, MESSRS., *St. Heliers, Jersey*.—Combined paring and breaking cultivator in lieu of skim plough.

Obtained the Prize Medal of the Royal Agricultural Society at Leeds, July, 1861 ; and the First Prize of the Jersey Royal Agricultural Society, May, 1861.



PARING AND BREAKING CULTIVATOR.

This implement is guaranteed to work in all kinds of soil, and will do from 3 to 4 acres per day, performing the work of the skim plough, harrow, and scarifier, at one operation. It also acts as a turn-furrow plough to deposit all kinds of seed. It may be used as a subsoil plough, as all the working parts are disconnected. The makers can guarantee a saving of 50 per cent. by its use.

Application can be made to Messrs. Samson & Jewell,

Jersey ; W. H. Samson, Underhill, Iden, Sussex ; and Mr. S. Jewell, Nursling, Hants ; A. Lewis De Jongh, Bishopsgate Street Within, London ; Messrs. Tasker & Sons, Andover, Hants ; or to Edward Parsons Fowler, travelling agent.

Prices :—

Double-action steam plough	55 gs.
Single-action plough, drawn by 4 horses	25 gs.

[2178]

SAMUELSON, BERNHARD, *Banbury, and 76 Cannon Street West, London*.—Harvesting and food-preparing machinery. (*See page 95.*)

[2179]

SCOTT, THOMAS, *18 Parliament Street*.—Self-regulating drinking trough for cattle and sheep.

[2180]

SCOTT, THOMAS, *Newcastle, county Down, Ireland*.—Carrot-seed bearding and dressing machine ; grass-seed separating apparatus.

RUSTON, PROCTOR, & Co., *Lincoln, and Kennet Wharf, 67 Upper Thames Street.*—Eight-horse power portable engine, and combined finishing and thrashing machine.

R. P. & Co. will exhibit during the season in Classes VIII. and IX. their celebrated prize portable steam engines and thrashing machines, which have in public

competition won the highest honours, as will be seen from the following list of prizes which have recently been awarded them for their tested excellence :—

St. Petersburg, 1860. The Gold Medal and Diploma of Merit.

Burnley, August, 1860. Five Pounds and Silver Medal.

Gothenborg, 1860. Two Prize Medals.

Bolton, September, 1860. The First Prize and Silver Medal.

Whitchurch, 1861. The First Prize.



Mecklenburg-Schwerin, 1861. The Two First Silver Medals.

Chorley, 1861. Ten Pounds and Silver Medal.

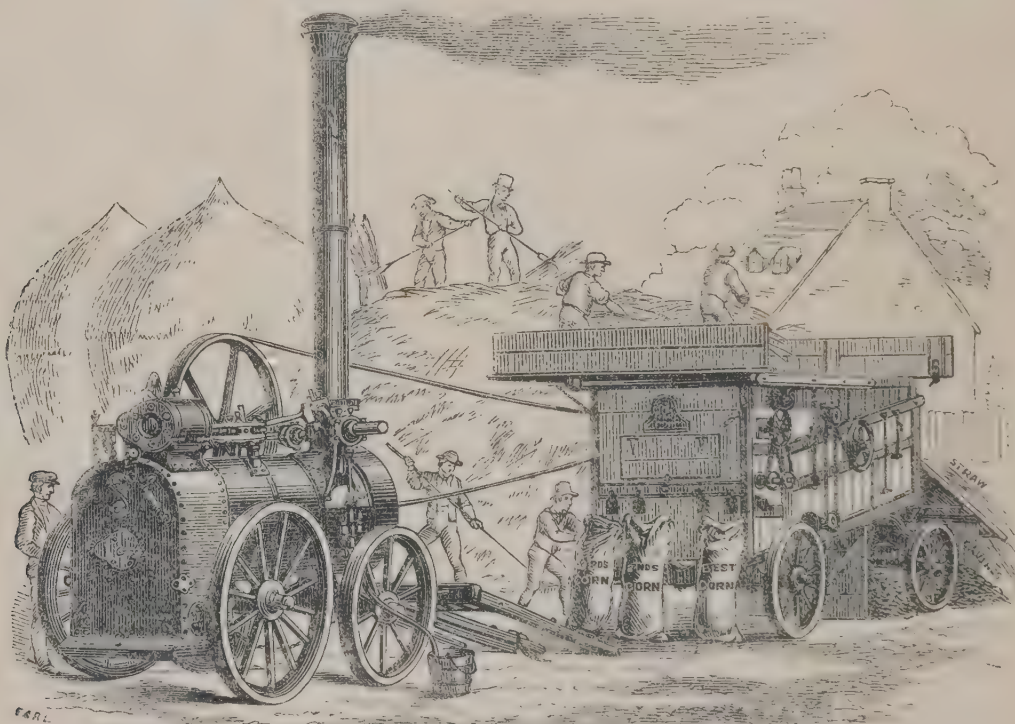
Ashton-under-Lyne, 1861. The Two Silver Medals.

Belfast, 1861. The Silver Medal.

And numerous other money awards and high commendations.

These engines and thrashing machines are now in extensive use throughout Europe. They are especially remarkable for their extreme simplicity of arrangement,

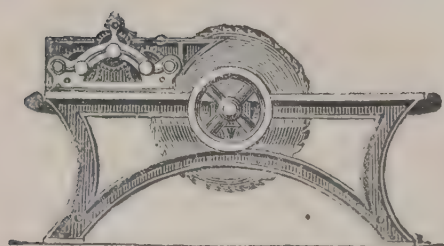
strength of construction, high finish, economy in working, and general efficiency for all the purposes of their construction.



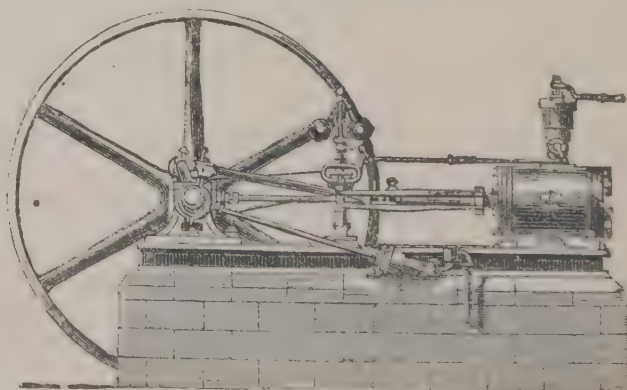
PORTABLE ENGINE AND FINISHING AND THRASHING MACHINE AT WORK.

Ruston, Proctor, & Co. are prepared to execute orders without the least delay for their improved portable and fixed engines, from 2 to 50 horse-power; thrashing

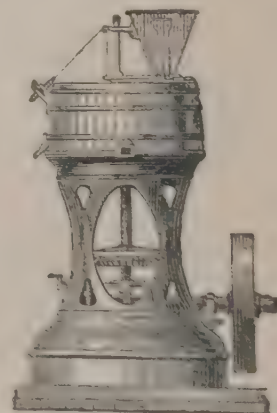
machines, flour mills, portable or fixed; sawing benches, timber mills, bone mills, steam pumps, mortar mills, winding gear, &c.



CIRCULAR SAWING BENCH.



FIXED STEAM ENGINE.



PORTABLE FLOUR MILL.

Illustrated catalogues, with prices and descriptions, may be had on application at the stand, or at the

Sheaf Iron Works, Lincoln, or Kennet Wharf, 67 Upper Thames Street, London.

SAMUELSON, BERNHARD, *Banbury, and 76 Cannon Street West, London.*—Harvesting and food-preparing machinery.



HARVESTING AND FOOD-PREPARING MACHINERY.

SAMUELSON'S SELF-RAKING REAPING MACHINE. (R. C. Ransome & Samuelson's combined patents.)

PATENT SELF-RAKING REAPING MACHINE, which deposits the grain in sheaves, clear of the track of the horses, by means of revolving rakes. Power required, 2 horses walking at the ordinary farm pace. Width of cut, 5 ft.

Price for full crops £38. 0
If with 4 arms, for light and continental crops 36 0

SAMUELSON'S PATENT MEADOW-MOWING MACHINE is distinguished for the flexibility of the cutting apparatus, which enables it to follow the undulations of uneven ground, and to avoid contact with any obstacles. Made of various widths for the draught of 1 or 2 horses.

Price, according to width of cut, £20 to . . £23 0
The same with reaping attachment for cutting grain as well as grass, £26 to £29 0

SAMUELSON'S HAND-RAKING REAPING MACHINE, with side and back delivery, for 1 and 2 horses.

Price, according to width of cut, £16 to . . £17 17

SAMUELSON'S (MAINWARING'S & BOYD'S PATENTS), LAWN-MOWING MACHINES, with Mainwaring's silent wheels, and Boyd's self-cleaning apparatus, for rolling, cutting, and collecting grass on lawns at one operation. Power, varying according to width, from that of a boy, to a light horse. Price, from £5 to £15 15

SAMUELSON'S IMPROVED HORSE RAKE, with steel teeth, width $7\frac{1}{2}$ ft. and $8\frac{1}{2}$ ft. Prices, £8 and . . . £8 10

SAMUELSON'S PATENT GARDNER'S TURNIP CUTTERS, for cattle, calves, sheep, and lambs, on iron and wood frames, cutting the last flat piece of each root to the proper size. By reversing the motion, they are made to cut for cattle or sheep, and by adding the so-called lamb-plates, the cattle knives are made to cut for calves, and the sheep knives for lambs.

Prices, £4 to £6 18 6

SAMUELSON'S & CORBETT'S PATENT ROOT-PULPING MACHINES, for reducing roots so as to be fit for mixing with chaff, cake, or corn. Prices, £4 10 to . . £8 8

SAMUELSON'S IMPROVED IRON-FRAME CHAFF CUTTERS. The two sizes exhibited are adapted specially for export owing to the small compass into which they can be packed.

Price £3 and £5 0
Other sizes from £2 15s. to 13 0

SAMUELSON'S PATENT OIL-CAKE BREAKERS for feeding only, and for feeding and manure, £2 to . . . £8 10

SAMUELSON'S NEW PATTERN GARDEN ROLLERS, £1 12s. 6d. to £4 0

SAMUELSON'S IMPROVED GARDEN ENGINES, £4 to 5 0

[2181]

SELLAR, GEORGE, & SON, *Huntley, Aberdeenshire*.—General plough for home and colonial use ; large plough, ridging plough.

GENERAL PURPOSE PLOUGH, for home and colonial use ; with improved long steel mould board and wrought-iron frame and share. Constructed not only for producing the finest style of ploughing on cultivated farms, but for standing the rougher work of reclaiming land in the colonies.

These ploughs have carried an immense number of prizes at shows and ploughing matches at home ; while in Australia they have been more successful than those of any other maker.

Price £4 15

With land wheel, as exhibited, 7s. 6d. extra.

LARGE PLOUGH for deep ploughing, with wrought-iron frame and share. This plough has carried the first prize at every competition where it has been put forward.

Price £6 0

With steel, instead of cast-iron, mould board, 18s. extra.

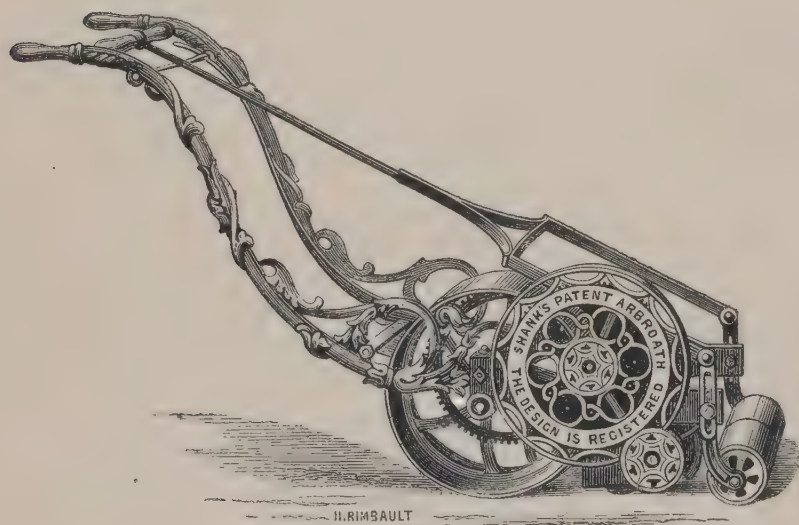
RIDGING OR DRILL PLOUGH, with drill gauge,—specially suited for turnip culture, being adapted for effectually covering in the manure, and topping the ridge so as to leave the finest of the soil where the seed is deposited.

Price £4 5

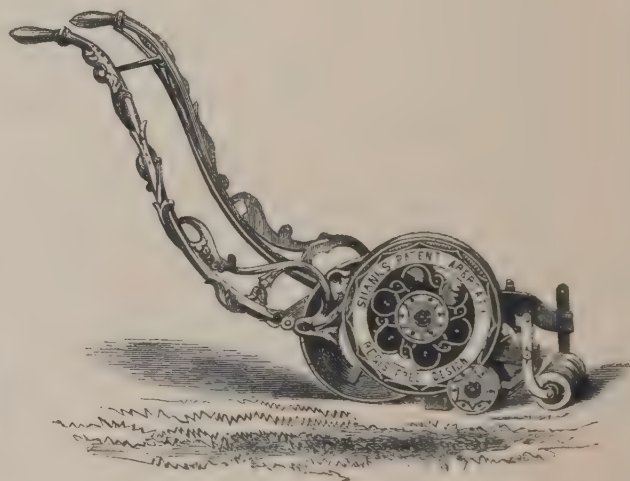
With steel, instead of cast-iron, mould boards, 20s. extra.

[2182]

SHANKS, A., & SON, *Arbroath* ; Sole Agents for London, J. B. BROWN & Co., 18 *Cannon Street, City*.—Improved lawn mowers.



NEW HAND MACHINE.



NEW SMALL HAND MACHINE.

SHANK'S NEW PATENT LAWN MOWING, ROLLING, COLLECTING, AND DELIVERING MACHINE for 1862. (With silent motion if specially desired.)

SHANK'S NEW HAND MACHINE mows the grass wet or dry, on lawns uneven or otherwise, in a much neater manner than the scythe, and at half the expense.

The exhibitors, in introducing their patent lawn mowers to the public for this season, do so with that confidence in their merits and superiority which the eminently successful result of their long and continued efforts to improve fully entitle them to have. The effect of the improvements of previous years has been so much appreciated by the practical gardener, that a large and steady increase in the number of machines sold has every year taken place, every one of which, so far as known, has given the greatest satisfaction. Further improvements have been introduced into the machines for this season, to which reference is respectfully made.

The patentees have brought out an entirely new hand machine, which combines, in addition to the improvements of last year's machine, other improvements of importance, with a new and tasteful design, which has been duly protected by registration. The new models have been produced without regard to expense, and the

patentees have been particularly careful in observing that all the parts possess sufficient strength and firmness to enable them to stand satisfactorily the tear and wear of out-door work, and the rather rough handling these machines are sometimes subject to from the labourer unskilled in machinery. A. S. & Son are gratified in being able to offer to the public a machine, which is not only a graceful ornament to the flower garden, but the most perfect and the most easily worked lawn mower that has ever been in use. The cutter (the most important part of the machine) is this season still further strengthened. The bearings, and everything tending to increase friction, and consequently the draught, are carefully constructed to reduce the friction to the smallest possible amount. The whole of the machines (horse, pony, and hand sizes) are fitted with care and precision, and possess the great advantages of ability to mow on uneven lawns without injury to the turf, of having loose rollers for ease in turning, of having wheels properly guarded, and so placed as to give an equal balance to either side of the machine. No change of rollers is necessary in mowing a verge or close to a flower bed.

The patentees feel convinced that the advantages possessed by their new machine over all others of its class will ultimately lead to its being the

SHANKS, A., & SONS, *continued.*

only, or almost the only, lawn mower in practical use.

Prices :—

SHANKS' PATENT HORSE MACHINE.

No. 1.	Width of cutter, 48 in.	. . . .	£28	0
No. 2.	ditto 42 in.	26	0
No. 3.	ditto 36 in.	22	0

Drawn by a horse.

No. 4.	Width of cutter, 30 in.	£19	0
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Drawn by a horse or strong pony.

Patent delivering apparatus for Nos. 1 and 2, extra £2; for Nos. 3 and 4, extra £1 10s.; silent movement, extra £1; boots for horses' feet, per set, £1 4s.

SHANKS' PATENT PONY AND DONKEY MACHINE.

No. 5.	Width of cutter, 30 in.	£15	15
No. 6.	ditto 28 in.	14	10

Drawn by a pony.

No. 7.	Width of cutter, 25 in.	£12	10
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Drawn by a donkey.

Patent delivering apparatus for Nos. 5 and 6, extra £1 10s.; for No. 7, extra £1 5s.; Silent movement, extra 12/6; boots for pony, per set £1 1s.; boots for donkey, per set 16/0.

SHANKS' NEW PATENT HAND MACHINE, for pushing or drawing, separately or together.

No. 8.	Width of cutter, 24 in.	£9	0	0
No. 9.	ditto 22 in.	8	7	6

Easily worked by 2 men.

No. 10.	Width of cutter, 19 in.	7	12	6
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Easily worked by a man and a boy.

No. 11.	Width of cutter, 16 in.	6	17	6
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Easily worked by a man.

No. 12.	Width of cutter, 13 in.	6	2	6
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Easily worked by a boy.

Patent delivering apparatus, if attached to the hand machine, extra, £1 5s. 6d.; Silent movement, extra, 7/0.

SHANKS' NEW PATENT SMALL HAND MACHINE for 1862 is made on the same elaborate and graceful model as their other new hand machine, and is specially intended to be used by ladies and gentlemen for recreation or amusement in the flower garden, and for small gardens where no regular gardener is kept.

The machine is fitted with one roller which is fixed to the shaft, and is so light and easily worked that no draw-rod is necessary. No person having a lawn, however small, should be without one of these useful machines. Nothing looks better in a garden than well-kept grass, and it is not possible to keep the grass well without a machine. The patentees particularly wish it to be borne in mind that these machines are not like toys, more for ornament than use. They are constructed to stand the tear and wear of many years; so that in point of economy, as well as in beauty of work, the mowing machine is unquestionably a most useful horticultural invention.

SHANKS' NEW PATENT SMALL HAND MACHINE for pushing only.

Prices :—

No. 16.	Width of cutter, 16 in.	. . . .	£6	5
No. 17.	ditto 14 in.	. . . .	5	15
No. 18.	ditto 12 in.	. . . .	5	5

Easily worked by a boy.

Silent movement, extra 4/0.

The above are net cash prices, and include carriage to most of the principal railway stations and shipping ports in the Kingdom.

The first practical gardeners of the day who have devoted their attention to examining all the different lawn mowers, do not hesitate in recommending Shanks' machine as the best mower for general use.

The patentees have had the honour of supplying their patent mowing and rolling machine to Her Majesty, for the Royal gardens at Kew, Windsor, Buckingham Palace, Hampton Court, Osborne, and Balmoral; to His Majesty the Emperor of the French; His Royal Highness the Prince of Prussia; His Excellency the Belgian Minister; the Right Hon. Lord Palmerston; His Grace the Duke of Bedford; His Grace the Duke of Sutherland; His Grace the Duke of Buccleuch; and to most of the principal nobility and gentry in the Kingdom. Their machines are also in operation in many of the botanic, and in many hundreds of other gardens in the Kingdom, as well as in almost every country throughout the world, where their merits have been fully proved, and their success established.

The machines are warranted to give ample satisfaction, and if not approved of they may be at once returned.

Sole agents for London, J. B. Brown & Co. 18 Cannon Street, City.

[2183]

SHARPE, BENJAMIN, *Hanwell Park, Middlesex.*—Grass harrows, by which grass and other crops are greatly increased.

[2184]

SMITH, GEORGE, 31 *St. John's Square, Clerkenwell.*—Enamelled garden labels.

[2185]

SMITH, WILLIAM, *Kettering, Northamptonshire.*—Patent horse hoe; winnowing machine; patent sugar machine; patent currant machine.

[2186]

SMYTH, JAMES, & SON, *Peasenhall, Suffolk; Witham, Essex; and Dieppe, France.*—Patent drilling and sowing machines. (See page 98.)

[2187]

SNOWDEN, WILLIAM, *King's Cross, London, and Gloucester.*—Paring plough. (See page 98.)

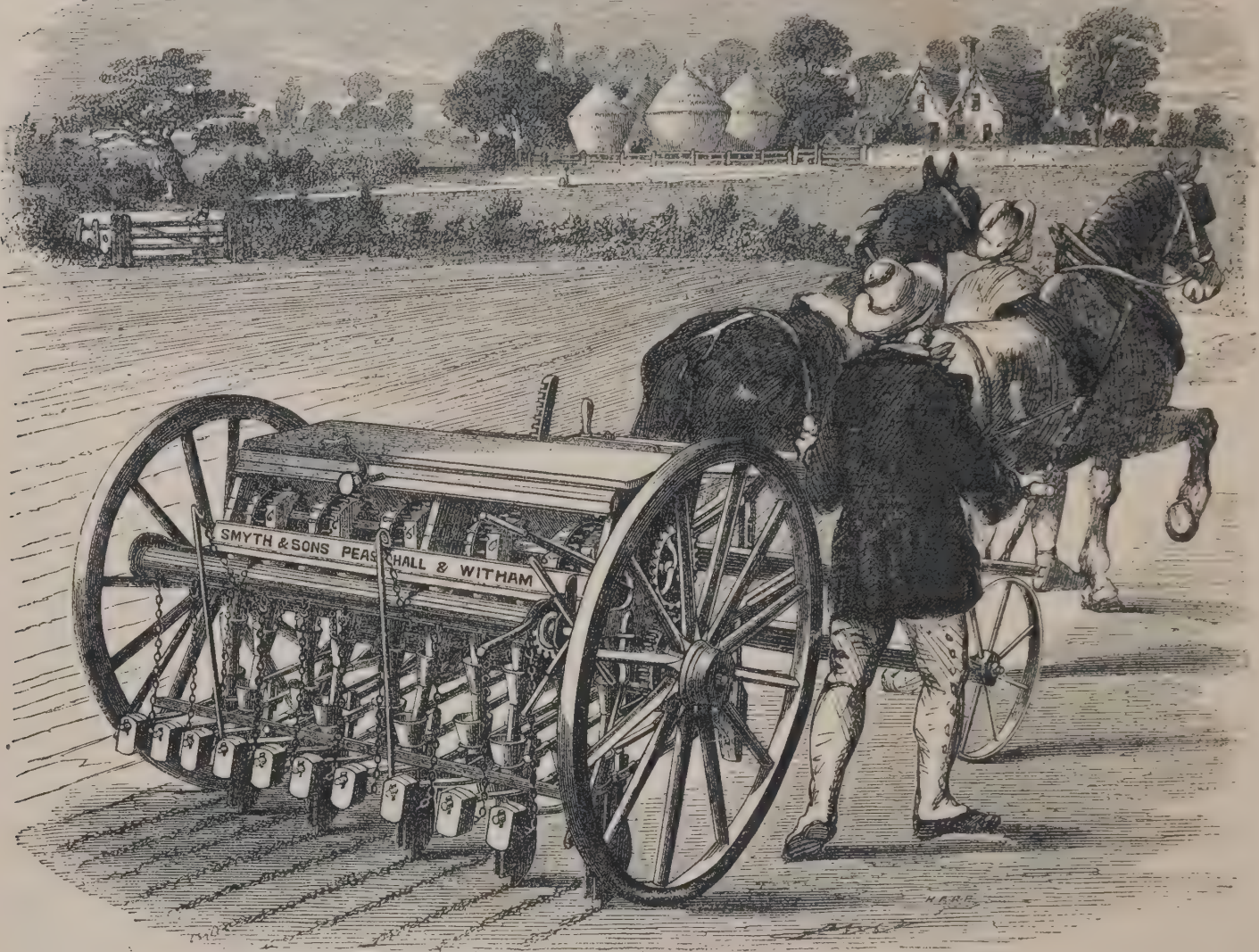
[2188]

STANLEY, JOHN, M., & Co., *Midland Works, Sheffield.*—Ornamental octagon conservatory.

[2189]

STEEVENS, W. 6, *Godolphin Road, Hammersmith.*—Steam plough for ploughing, cultivating, and tilling.

SMYTH, JAMES, & SONS, *Peasenhall, Suffolk; Witham, Essex; and Dieppe, France.*—Patent drilling and sowing machines.



PATENT LEVER CORN DRILL, WITH FORE CARRIAGE STEERAGE.

SNOWDEN, WILLIAM F. *King's Cross, London, and Gloucester.*—Paring plough; pares $\frac{3}{4}$ to 4 inches deep; turns the turf over and cuts it into lengths.



PARING PLOUGH.

SNOWDEN'S PATENT CHAMPION PARING PLOUGH, which has gained the Royal Agricultural Society's of England prizes at Chester and Warwick; the Royal Agricultural Society's of Ireland prizes at Londonderry, and 13 other prizes. It is the only implement that will pare any land from $\frac{3}{4}$ in. to 4 in. thick, turn the turf over, cut it into 1 or 2 ft. lengths as may be required.

Price complete £6 16 6
Ditto, for stubble 5 5 0

Testimonial from the Right Hon. the Earl of Essex.

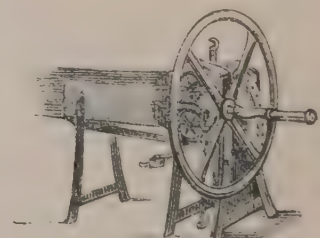
"Cassiobury, Watford,
"Nov. 23, 1861.

"SIR,—I have delayed giving you a report of your paring plough until I had had a fair trial of it, which I have now had, and it has been most satisfactory. I have used it for paring old spongy turf in nearly 5 miles of woodland drives, averaging 12 ft. wide. It performed its work admirably in 12 days at a cost of 9s. per day, £5 8s. I have no hesitation in saying that had I done it by hand labour it would have taken 10 men at least

5 or 6 weeks at a cost of £30 or £40. I have also used it for paring good sound turf for removal, and it did the work admirably. Next autumn I shall chiefly use it for paring and cleaning stubbles, and I feel sure it will be most efficient.

"You are welcome to make any use you please of this report.

"I am, yours faithfully,
"ESSEX."



CHAFF CUTTER.

SNOWDEN'S PATENT CHAFF CUTTER, HOP-BINE AND CANE-TOP CUTTER, will cut any length from $\frac{1}{4}$ in. to 3 in. long by only shifting a pin, and is more simple, more durable, and does more work with less labour than any other. Price,

For steam or horse-power £9 19 6
No. 2, for hand-power 8 8 0
No. 3, small for ditto 5 5 0

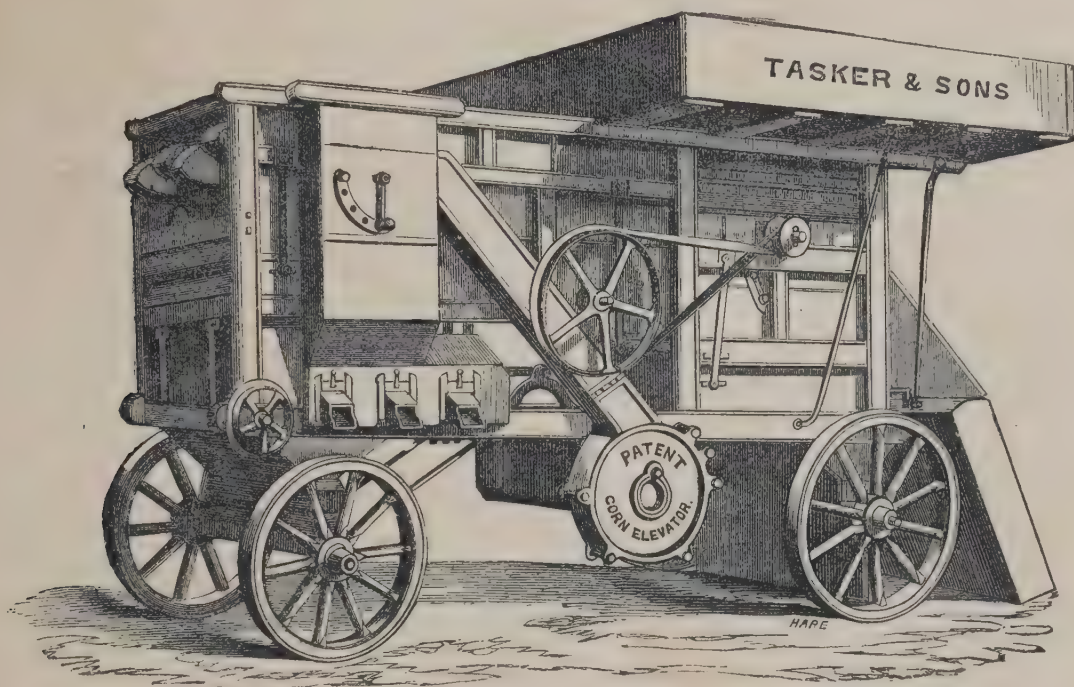
[2190]

TASKER & SONS, *Waterloo Iron Works, Andover, Hants.*—Combined thrashing and winnowing machine.

PATENT COMBINED THRASHING MACHINE for preparing all kinds of grain for market in one operation.

This machine will thrash every description of grain completely, separating the corn, straw, caving, and chaff from one another, delivering them in the places assigned to each. The drum beaters are less liable to split the corn than any other kind, perfectly cleaning the straw no matter what its condition may be.

The straw shakers possess all the advantages resulting from the use of 2 cranks; one only being used, the amount of tossing of the straw can be regulated as circumstances dictate. The short straws (or caving) are separated from the corn and chaff by the vibrating riddles. The winnowing apparatus is fitted with one fan and suitable screens for dividing the corn from the chaff, and conducting the former to the patent corn elevator to be elevated into the separating screen.



THRASHING MACHINE.

This machine is 3 ft. 4 in. wide, and can be driven with either a 3 or 4-horse power engine. It does its work equally well with the larger machines (requiring 8-horse power engines to work them), preparing the corn in one operation fit for market. In the construction of it none but the very best materials and workmanship have been employed, complication of working parts have been reduced to the smallest minimum, economising the expense in repairs, reducing friction, and consequently the power required to work it. The revolving separating screen is placed immediately across the machine, behind the drum, the several samples of corn on leaving it are conducted to either side of the machine, by suitable spouts, into the sacks placed to receive them. This arrangement removes the large projecting box in which the separating screen is usually placed from the side of the machine, not only giving it a neater appearance, but preventing all accidents to the same when being removed from place to place. The separating screen is novel in construction: its form is conical, the object being that as the corn passes down it, its diameter increasing, the amount of screening surface the corn has to pass over becomes greater.

In itself it is of the strongest form, the longitudinal bars are drilled, giving the required distances of the wires encircling it, and which wires are passed through these holes instead of being bound on the outside, as usually the case; from this it is obvious the mesh of the screen cannot be altered by the encircling wires shifting on the longitudinal bars. The bearings (which are supplied with lubricators) are almost all external, and so open the internal parts of the machine to view.

These small machines will be found of great advantage to persons whose extent of occupation precludes their employing engines of greater power than 4 horse, yet the

same results are obtained, and the engine can be used for driving mill-stones, bruising mills, chaff cutters, and other barn machinery.

Price of engine for above machine, 4-horse power. £165 0

The advantages of the corn elevator in this machine, are:—

1. It elevates any description of grain in any quantity, without the use of the ordinary tins.
2. It dispenses with the second blower, as the corn is dressed in its passage to the separating screen, from which it is delivered in different samples fit for the consumer.
3. It greatly simplifies the machine, inasmuch as the barley, horner, 2 fans, 2 sets of elevators, tins, 6 straps, and 17 pulleys are dispensed with, thereby economising wear and tear to a considerable amount.

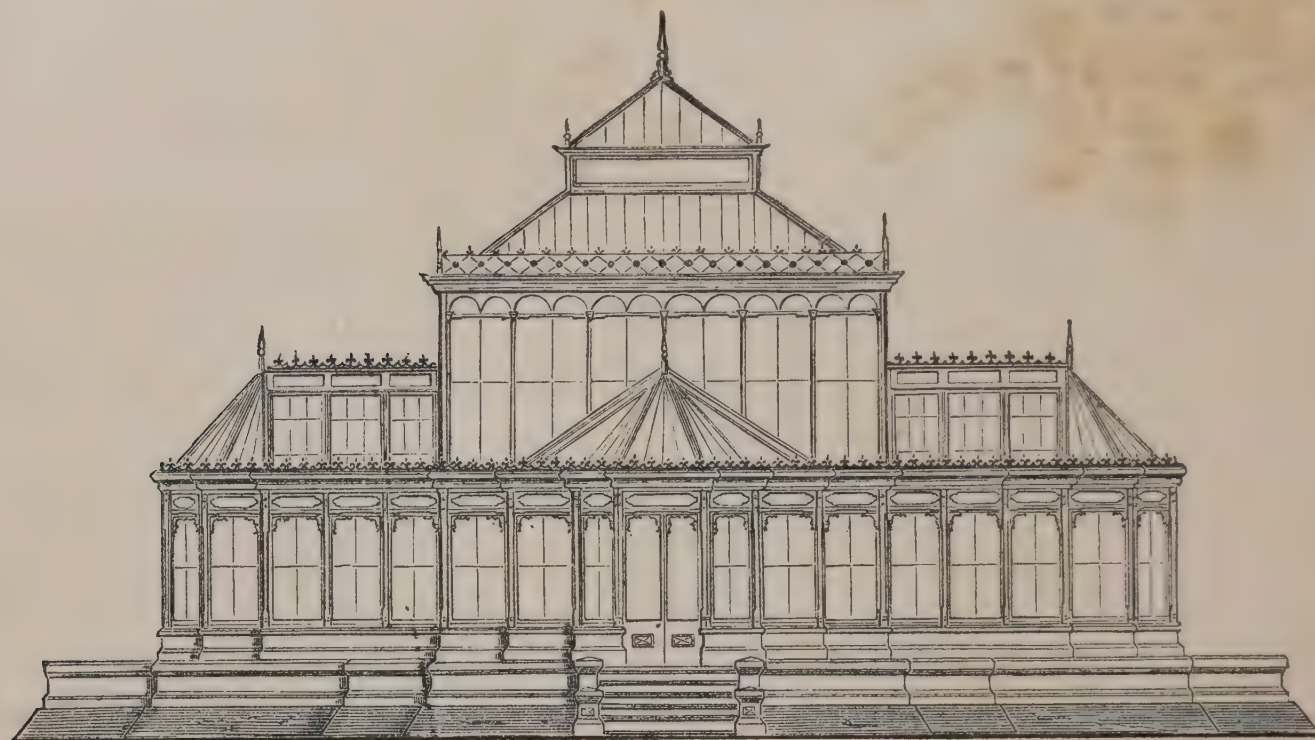
Prices:—

3 ft. 4 in. wide in drum, suitable to be driven by a 3-horse engine	£84 0
3 ft. 9 in. or 4 ft. wide in drum, suitable to be driven by a 4 or 5-horse engine	93 0
4 ft. or 4 ft. 6 in. wide in drum, suitable to be driven by a 6 or 7-horse engine	110 0
4 ft. 6 in. wide in drum, suitable to be driven by a 7 or 8-horse engine	120 0

[2191]

TAYLOR, J., & SONS, *Kensall Green, London, W.*—Conservatory, double chambers and improved horizontal tubular boiler, furnace doors, &c.

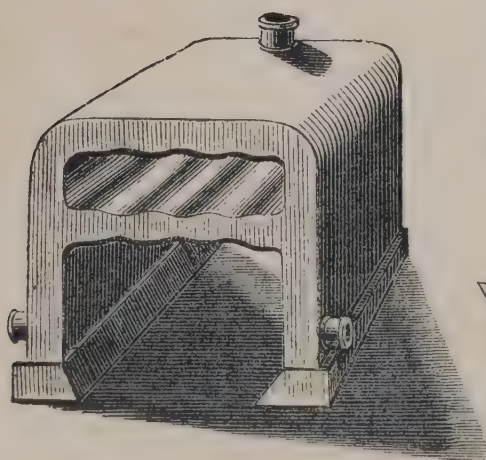
J. TAYLOR & SONS call the attention of the nobility and gentry to the very superior manner in which they erect conservatories, vineries, forcing, fruit and plant houses of every description, combining the most modern improvements with elegance of design and durability of material and workmanship. They undertake the arrangement for heating with hot water, on the most improved and economical principles, churches, man-



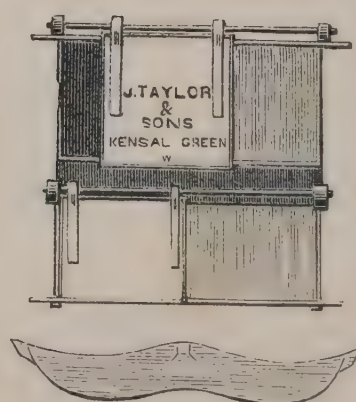
ORNAMENTAL CONSERVATORY.

sions, public buildings, baths, horticultural buildings, &c.

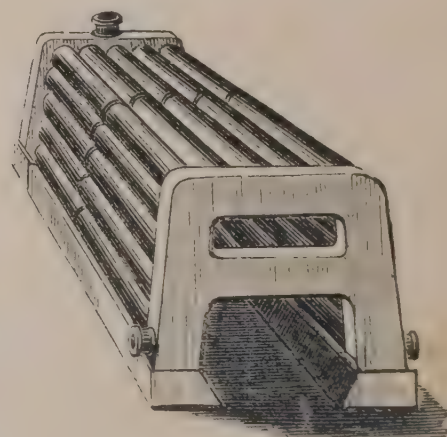
J. T. & Sons' ventilating apparatus supersedes any now in use as being the most simple and effective.



DOUBLE CHAMBER
CORRUGATED BOILER.



FURNACE DOOR
AND BAR.



HORIZONTAL TUBULAR
BOILER.

[2192]

TEGETMEIER, W. B., *Muswell Hill, N.*—Movable frame and permanent observatory beehives.

In these hives each comb is in a separate frame, which may be removed alone, thus every comb is under control, and full honey-combs, or brood-combs for rearing queens, may be withdrawn. The virgin honey is removed in top boxes.

The observatory hive has each side formed of 4 plates of glass, and preserves its temperature through the winter.

Price £1 1

[2193]

THOMPSON, HENRY ATWOOD, *Lewes, Sussex*.—Entrance and other gates, &c. (See page 102.)

[2194]

TURNER, E. R. & F., *Ipswich*.—Portable steam engine, &c. (See pages 103 to 105.)

[2195]

TUXFORD & SONS, *Boston, Lincolnshire*.—Portable steam engines, road locomotives, thrashing, stacking, grinding, and sawing machinery.

[2196]

TYE, JOHN, *Lincoln*.—Double mill, French stones, and governors. (See page 106.)

[2197]

TYLER, HAYWARD, & CO., 85 *Upper Whitecross Street, E.C.*—Garden engines, conservatory pump, syringes, fountain jets.—(See page 45.)

[2198]

UNDERHILL, W. S., *Newport, Salop*.—Corn elevator, thrashing machine, &c. (See pages 107, 108.)

[2199]

WALLIS & HASLAM, *Basingstoke*.—2-horse and 3-horse portable thrashing machines, flour mill, ploughs, harrows, patent spherical bearings. (See page 109.)

[2200]

WARNER, JOHN, & SONS, *Crescent, Cripplegate, London*.—Garden engines, pumps, syringes, fountains, fumigators for graperies. (See page 110.)

[2201]

WEEKS, JOHN, & COMPANY, *King's Road, Chelsea*.—Improved boiler, ornamental heating stacks, models of conservatories, &c.

[2202]

WEIR, EDWARD, 142, *High Holborn*.—Spirit draining levels with French and English scales, churns, and irrigating pumps.

[2203]

WILKINSON, WRIGHT, & CO., *Boston, Lincolnshire*.—Steam engines, &c. (See page 111.)

[2204]

WILLISON, ROBERT, *Alloa, N.B.*—Ventilator for vineries, lift and force pump.

[2205]

WOODBOURNE, JAMES, *Park Iron Works, Kingsley, near Alton, Hampshire*.—Improved machine for packing hops.

[2206]

WOODS & COCKSEGE, *Suffolk Iron Works, Newmarket*.—New iron horse-gear, &c. (See page 112.)

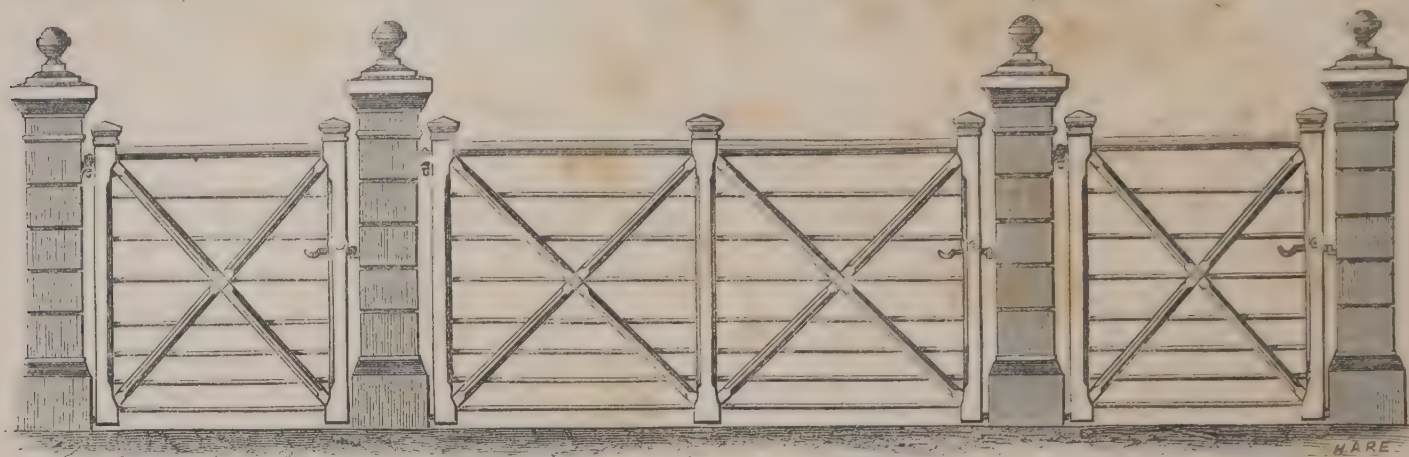
[2207]

YOUNG, J. & T., *Vulcan Foundry, Ayr*.—Drill for mangold wurzel and turnip seed.

YOUNG'S REGISTERED DOUBLE-DRILL TURNIP AND MANGOLD WURTZEL DROP-SOWING MACHINE, drops the seed continuously or at almost any required distances apart; and is so constructed as to work effectually, however unskilful the person may be who is attending it. Being made wholly of cast and malleable iron, it is not liable to be damaged either by the weather or rough usage,

and can sow in damp weather when most other machines must stop. By using this machine, a saving of one-half the seed is effected; and the plants can be thinned for from 1/6 to 2/0 less per acre than if the common machine were used. Price, at the Works . . . £6 0
This machine has gained 6 first prizes and several silver medals at some of the leading agricultural exhibitions.

THOMPSON, H. ATWOOD, *Lewes, Sussex*.—Entrance and other gates, drainage instruments, &c.



ENTRANCE GATES.

SET OF ENTRANCE GATES, WITH CAST-IRON PIERS.

These gates are constructed on a principle which gives great strength with an ornamental appearance. They are made of iron and wood, the latter forming a trussed framing which is tied by the former, so that it is impossible for them to drop from wear or ill-usage. The mountings are a peculiar combination of levers, whereby the gates will close themselves without jar; and the latches have locking fastenings. They may be had of any size, and finished in any style.

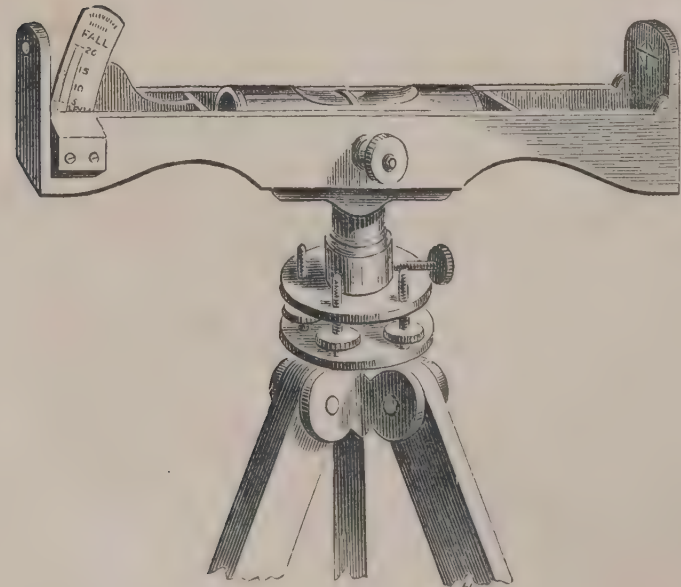
10 ft. centre gate, grained oak	£6 10
2 side gates, £4 10s. each	9 0
Eccentric lever mountings	4 10

CAST-IRON PIERS FOR ENTRANCE GATES, cheaper and more durable than stone, and quite equal to it in appearance, weighing nearly $\frac{1}{2}$ ton each. Price, each . . £7 7

9-FEET ENTRANCE GATE AND CAST-IRON PIERS, on the same construction as preceding, but with smaller piers.	
Price of gate	£4 10
Eccentric lever mountings	1 10
Iron piers, weighing about $5\frac{1}{2}$ cwt. each	4 15

9-FT. FIELD GATE, on the same principle, with hangings complete.	
Price	£2 10
Wood posts, 7 ft. square, to match, each	0 8

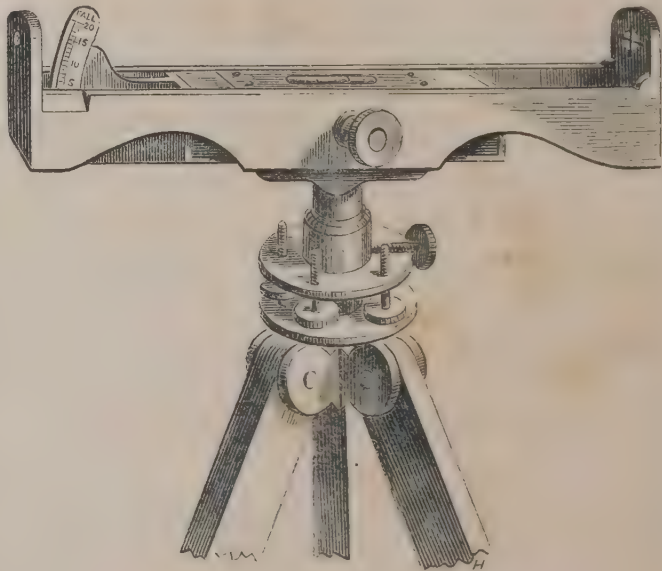
CAST-IRON CAPS AND MOULDINGS of various sizes for wood posts. Per pair,	
7 in.	£1 0
8 in.	1 5
9 in.	1 10
10 in.	1 15
12 in.	2 0



“ECONOMIC” DRAINAGE LEVEL.

Gold medal and 100 francs awarded to H. A. Thompson, for drainage levels, at the Exposition Universelle de Paris, 1856; and 2 silver medals by the Royal Agricultural Society of England.

ECONOMIC DRAINAGE LEVEL. A cheap and accurate instrument, well adapted for all ordinary purposes in draining, and may be used by a labourer of ordinary intelligence. Price £1 18



“IMPROVED ECONOMIC” DRAINAGE LEVEL.

IMPROVED ECONOMIC DRAINAGE LEVEL, similar in principle to Economic, but entirely of metal, with a brass mounted spirit tube of the best quality. Price £2 15 0

TELESCOPE DRAINAGE LEVEL. This instrument is constructed entirely of brass, with a telescope attached; it is simple and accurate. Price, including polished case and levelling staff £5 10

WORKMAN’S BEVEL, a modification of the plumb level, to enable an inexperienced workman to work accurately to any gradient. Price £0 18 6

GRADUATED LEVELLING STAFF, with sliding vane. Price £0 12 6

Mahogany SLIDING STAFF, 9½ ft. 2 2 0

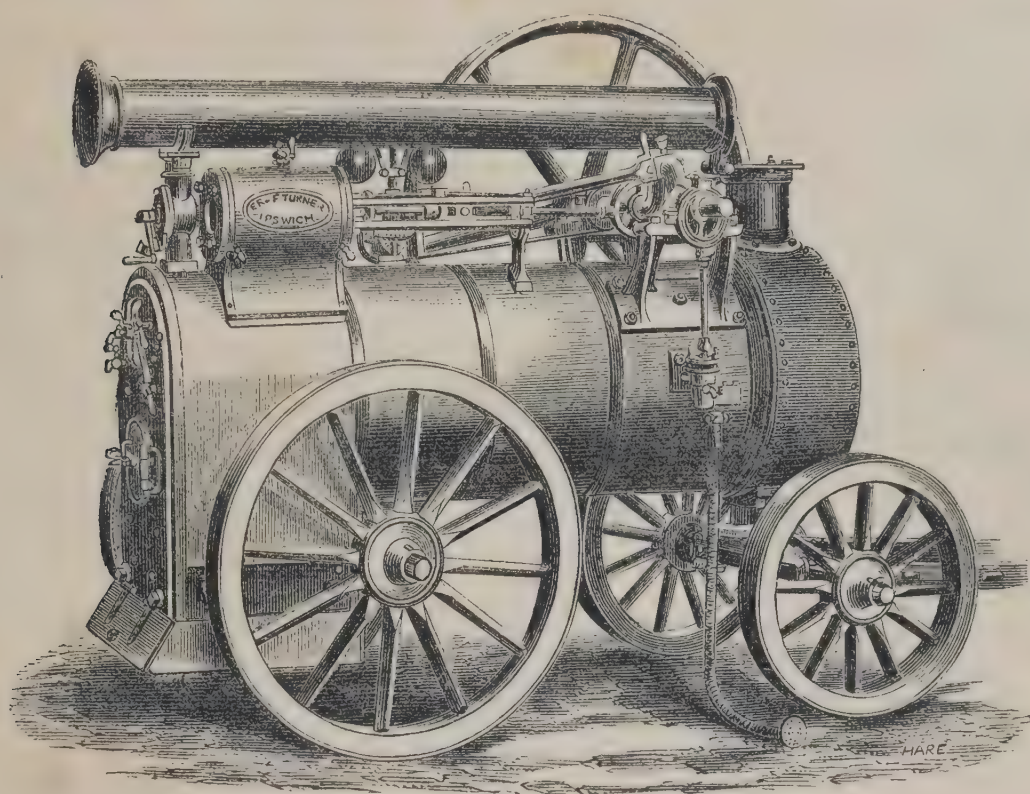
CROSS STAFF, with brass head 0 15 0

Ditto, with compass 1 0 0

LAND CHAINS, OFF-SET STAFFS, &c.

TURNER, E. R. & F., *Ipswich*.—Portable steam engine, thrashing and dressing machine, corn crushing mills, &c.

Obtained the First Prizes of the Royal Agricultural Society of England for their Corn Crushing Mills in 1849, 1853, 1854, 1855, and 1860; the Society's Silver Medal for Thrashing Machine in 1860; Prize Gold Medal and 150 Francs at the French Universal Exhibition of Agriculture, 1856; Large Silver Medal at the Imperial Exhibition of Agriculture, at Vienna, 1857; 3 Medals in Silver-gilt and Silver, and 750 Francs, for Steam Engine, Thrashing Machine, and Corn Crusher from the Royal Agricultural Society of East Flanders, 1861.



E. R. AND F. TURNER'S PORTABLE STEAM ENGINE.

1. A PORTABLE STEAM ENGINE OF 4-HORSE POWER.

The cylinder is $6\frac{1}{4}$ in. diameter; length of stroke, $10\frac{1}{2}$ in. The fly wheel, which serves also as a driving pulley, is 4 ft. 4 in. diameter, and makes 140 revolutions per minute. The crank shaft is of wrought-iron, it admits of the fly wheel hanging on either end, and of an additional driving pulley. The feed pump has two delivery valves and a tap to regulate the quantity of water. The pump valves, slide valve, cylinder, piston, and every part of this engine are so constructed, as to afford the greatest facility for repairs or adjustment. The boiler is of the ordinary locomotive form; it is strongly stayed and proved both with steam and water at a high pressure; it has ample heating and evaporating surface, as well as water space. The fire-box is of Low Moor iron, the tubes are 20 in number and $2\frac{1}{2}$ in. diameter. There is a plug at the top of the fire box, which fuses at a low temperature, thus preventing any serious accident arising from the water getting too low. The exterior of the boiler and cylinder are clothed with wood, and neatly cased over with sheet iron. The engine is mounted on a run of 4 wood wheels with iron axles, and improved locking gear, and is furnished with a pair of horse shafts, wheel skid, tube cleaner, firing tools, and waterproof cover.

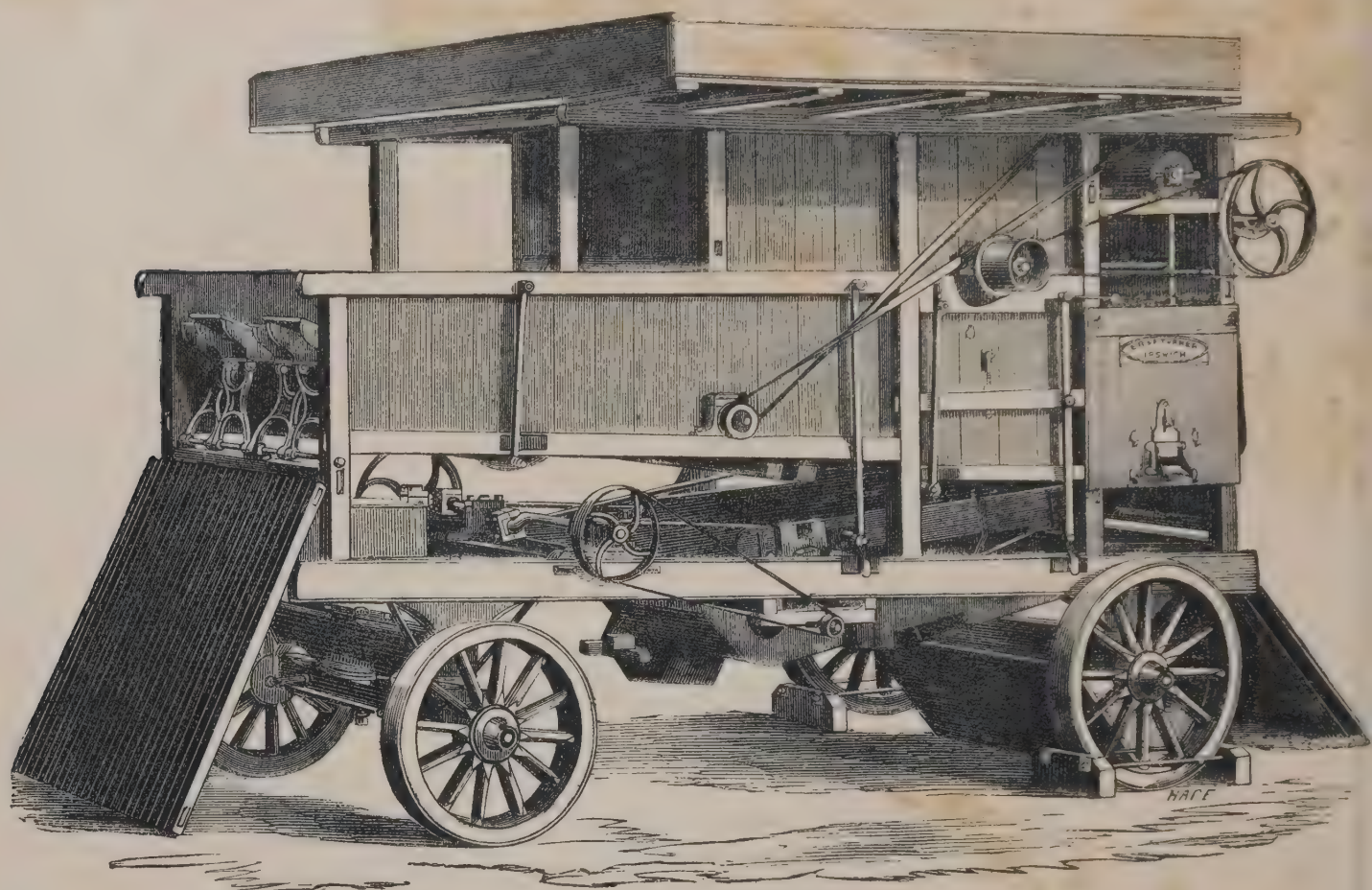
Price £155 0
Steam Gauge £3 extra.

2. A COMBINED PORTABLE THRASHING AND DRESSING MACHINE.

The "drum" or thrashing part is 4 ft. wide, and is with the breastwork so constructed as to effectually thrash out the grain without injuring it. The straw passes to the end of the machine over a set of frames worked by a crank motion, forming an effective straw shaker, through which the corn, which would otherwise be carried along by the straw, falls on to the riddle board beneath. The bulk of the corn descends from the thrashing part on to the riddle board, and passes on to a wooden riddle perforated and channelled, through which the corn and chaff fall, whilst the short straws are conveyed to the ground. After passing through the riddle, the chaff is separated by the blast of a fan, and the chobs removed by a wire screen, the corn descending into a box whence it is elevated into the barley horning barrel, which carries it to the other side of the machine and delivers it on to a sieve box to be again sifted and winnowed, all foreign substances being thus removed. It then falls on to a patent screen, which separates the small corn from the large, and delivers the bulk a perfect sample into the sack ready dressed for market.

This machine is worked with ease by the 4-horse power steam engine previously described, thrashing and dressing

TURNER, E. R. & F., *continued.*

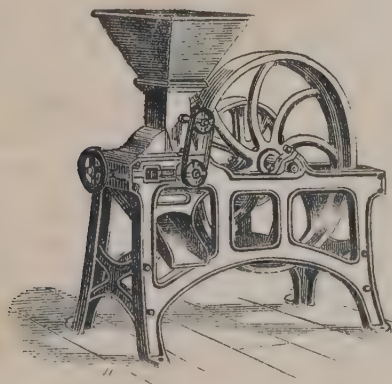


E. R. AND F. TURNER'S COMBINED THRASHING AND DRESSING MACHINE.

from 30 to 40 quarters of corn per day, doing equally well wheat, barley, rye, and other grain.

Price. £80 0

The manufacturers make machines similar to the above, but without the finishing dressing apparatus, at a cost of £65. These machines may be worked by their 3-horse power engines.



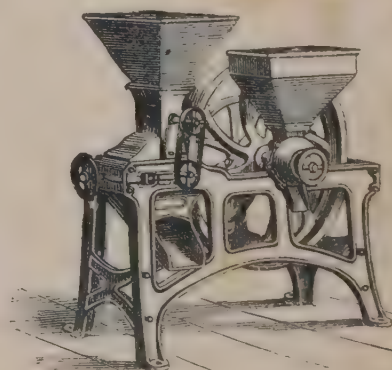
3. A CORN, SEED, AND MALT CRUSHING MILL (No. 8).

It consists of a large wheel or roller 4 ft. diameter by 6 in. wide, working in contact with a smaller roller of equal width. Between the surfaces of these rollers the corn, &c. is crushed, pressure being applied to the small roll by means of a screw and spring. By this arrangement several advantages are gained, the large roller acting also as a fly-wheel insures regularity of motion; in conjunction with the small roll its capacity for crushing is fully as great as if in conjunction with a roller of its own size, thus economizing both cost and space. The smaller roller

is also more readily influenced by the springs, the elastic pressure thus gained tending to promote the efficiency of the work done, as well as increasing the durability of the surfaces.

Price. £18 1

Pulley for power, £1 2s. extra.



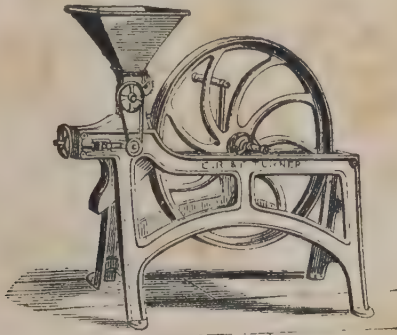
4. A CORN, SEED, AND MALT CRUSHING MILL, WITH BEAN MILL COMBINED (No. 8 B).

The crushing part of this mill is precisely like that of the preceding one. The bean mill consists of a pair of metallic plates, the one fixed to the mill frame, the other revolving with the spindle; they are readily adjusted, are very durable, and easily renewed. This mill admits of being used simultaneously for crushing corn and grinding beans.

Price £24

Pulley for power, £1 2s. extra.

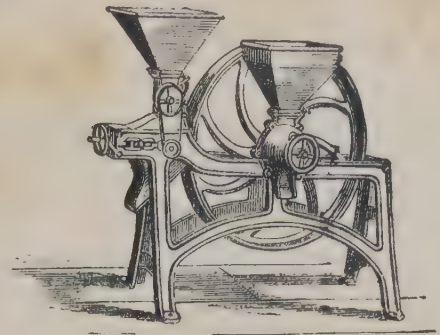
TURNER, E. R. & F., *continued.*



. A CORN, SEED, AND MALT CRUSHING MILL (No. 1).

The large roll is 3 ft. 10½ in. diameter by 4 in. wide, in other respects the description of article 3 applies to this mill.

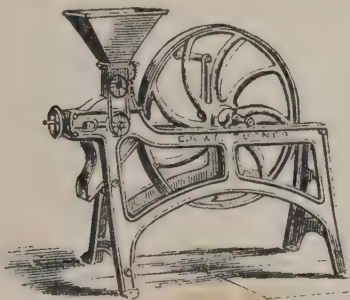
Price £12 0
Pulley, 17s. 6d. extra.



6. A CORN, SEED, AND MALT CRUSHING MILL, WITH BEAN MILL COMBINED (No. 1 B).

The crushing part of this mill is like article 5; the description given of bean mill with article 4 applies to this.

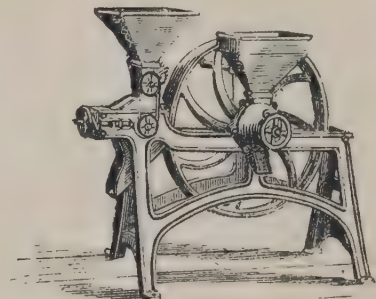
Price £15 0
Pulley, 17s. 6d. extra.



7. A CORN, SEED, AND MALT CRUSHING MILL (No. 2),

On the same principle as the preceding, the large roll being 3 ft. 2 in. diameter by 3½ in. wide. This mill may be used by hand as well as by horse or steam power.

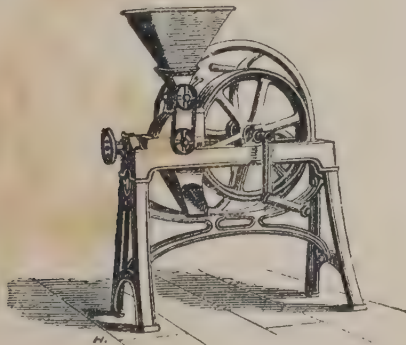
Price £8 0
Pulley, 15s. extra.



8. A CORN, SEED, AND MALT CRUSHING MILL, WITH BEAN MILL COMBINED (No. 2 B),

On the same principle as those already described, the crushing part corresponding in size with article 7.

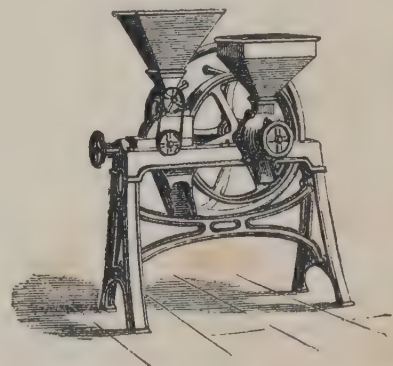
Price £10 10
Pully, 15s. extra.



9. A CORN, SEED, AND MALT CRUSHING MILL (No. 7),

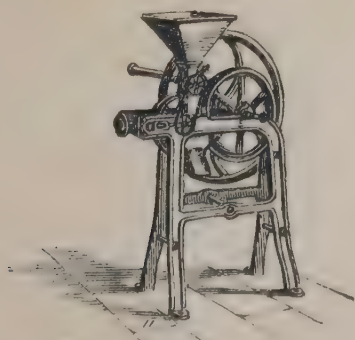
For hand power, the large roller 2 ft. diameter by 4 in. wide; it is furnished with a fly wheel, in other respects the description of the preceding articles apply to it.

Price £6 10



10. A CORN, SEED, AND MALT CRUSHING MILL, WITH BEAN MILL COMBINED (No. 7 B).

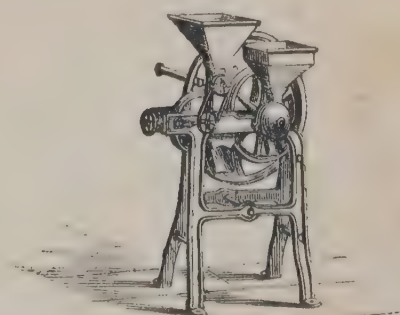
Price £8 8



11. A CORN, SEED, AND MALT CRUSHING MILL (No. 6),

For hand power, the large crushing roller is 1 ft. 6 in. diameter by 2½ in. wide.

Price £4 15



12. A CORN, SEED, AND MALT CRUSHING MILL, WITH BEAN MILL, COMBINED (No. 6 B),

In other respects like article 11.

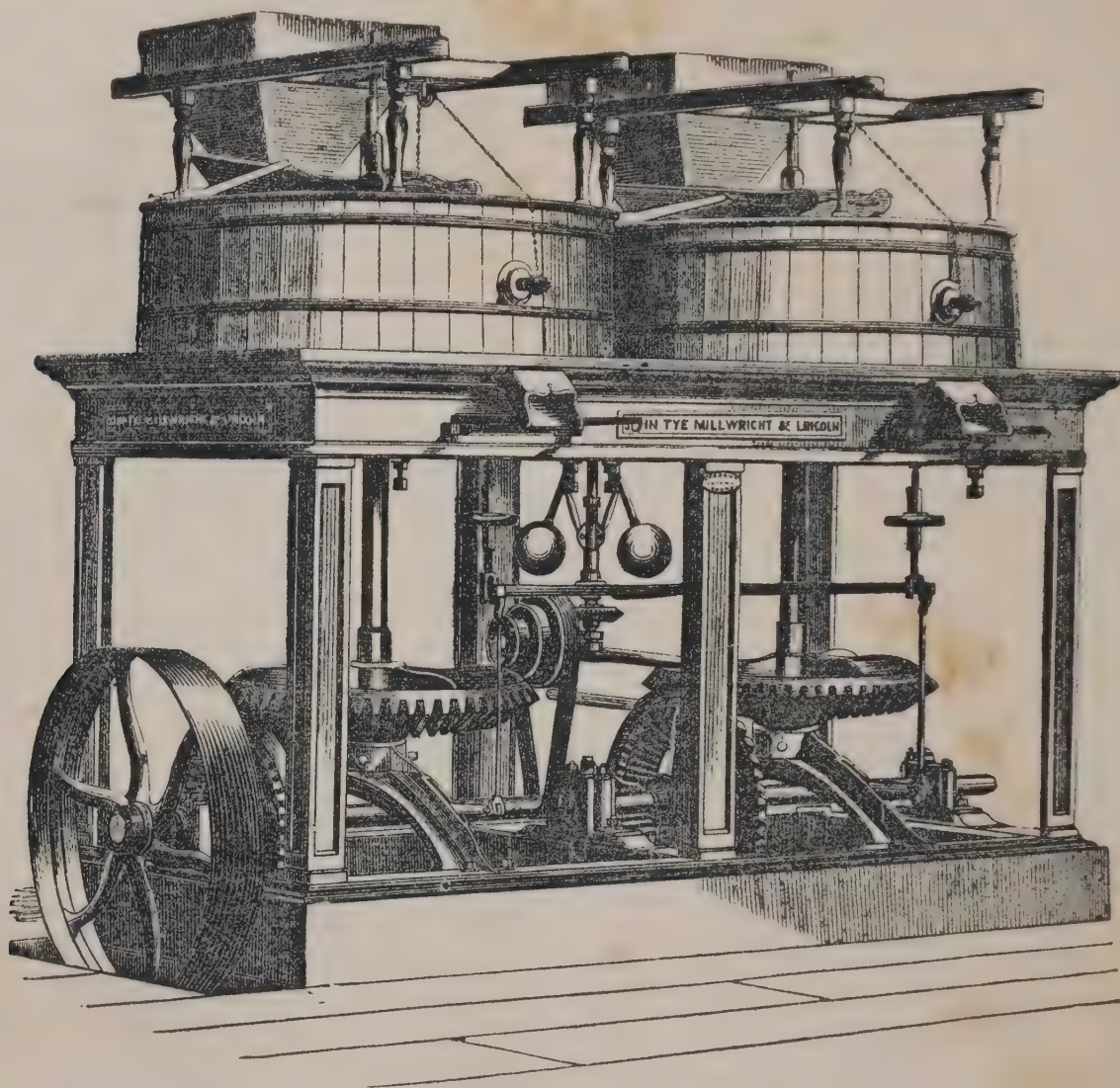
Price £5 15 6

TYE, JOHN, *Lincoln*.—Double mill fitted with two pairs, French stones, governors.

The exhibitor manufactures portable and fixed corn-grinding mills, flour-dressing machines, with wood and iron cylinders; silk machines, for dressing flour; improved barley mills, for making pearl barley for agricultural purposes; smut machines, French burr stones, &c.; and deals in Derbyshire greystones, mill chisels, &c.

He also constructs and erects waterwheels in the most approved manner.

The following engraving represents a fixed corn-grinding mill on a metal frame, with 2 pairs of French stones, 4 ft. diameter, and governors attached for regulating the stones when at work, which makes it easy to manage.



FIXED CORN-GRINDING MILL.

It offers an advantage over any other, as it is portable, and can be set to work without being fixed to the walls, or fastened to the floors of a building. It is so constructed that it can be driven either by steam, wind, or water power.

J. Tye's portable and fixed corn-grinding mills are offered to the public, as unrivalled in the combination of advantages which they possess. For quality of material, strength of construction, high finish, and economy of working, they successfully maintain the first rank. They are admirably adapted for the foreign trade.

In addition to several prizes and medals, J. Tye has received a great quantity of flattering testimonials, both from home and abroad, testifying to the superiority of his mills.

Illustrated and priced catalogues can be had on application at the Works.

John Tye's improved corn-grinding mills received the prize at the North Lincolnshire Agricultural Show, held at Louth, 1857.

Highly commended by the judges, at the Meeting of the Royal Agricultural Society of England, held at Chester, July, 1858.

The prize at the North Lincolnshire Agricultural Show, held at Grimsby, 1859.

The silver medal at the Agricultural Show, held at Melbourne, Australia, 1859.

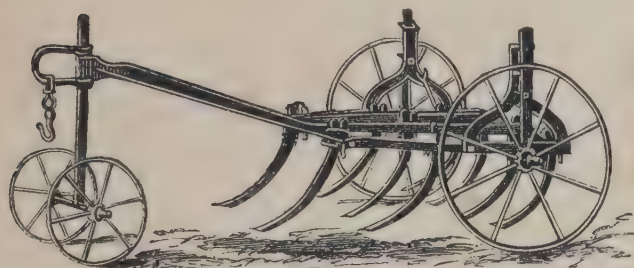
The silver medal at the Manchester and Liverpool Agricultural Society's Meeting, held at Liverpool, September, 1859.

The prize at the Meeting of the Royal Agricultural Society of England, held at Canterbury, 1860.

Also the prize at the North Lincolnshire Agricultural Show, held at Horncastle, July, 1860.

J. T. intends exhibiting at the Royal Agricultural Society's Meeting at Battersea Park, where mills may be seen at work in the trial yard.

UNDERHILL, W. S. *Newport, Salop.*—Corn elevator, thrashing machine, field and barn implements, patent game and poultry fences.



WROUGHT-IRON CULTIVATOR.

3-HORSE OR 7-TINED WROUGHT-IRON CULTIVATOR, invented, improved, and manufactured by the exhibitor, is now universally used, and wherever introduced during the last 17 years, it has superseded all others, including Ducie's, Coleman's, Howard's, &c. It is made entirely of wrought-iron, mounted on high wheels; the draft is light; it turns easily on the headlands, and is an implement well suited for exportation.

Price £6 0 0

LIGHT IRON GENERAL PURPOSE PLOUGH, marked A 3, improved and manufactured by the exhibitor. It is a good serviceable plough, easy of draught, and does its work neatly and well. Price £3 5 0

RIDGING PLOUGH, improved and manufactured by the exhibitor. The manner of adjustment is very simple and effective, and is fitted with the manufacturer's new pattern fore-end mould boards and cast shares.

Price £3 0 0

SET OF HARROWS, improved and manufactured by the exhibitor; suitable for general purposes.

Price £3 10 0

SET OF CHAIN HARROWS of a medium size, improved and manufactured by the exhibitor, for collecting twitch and dressing turf land. They are self-relieving.

Price £3 0 0

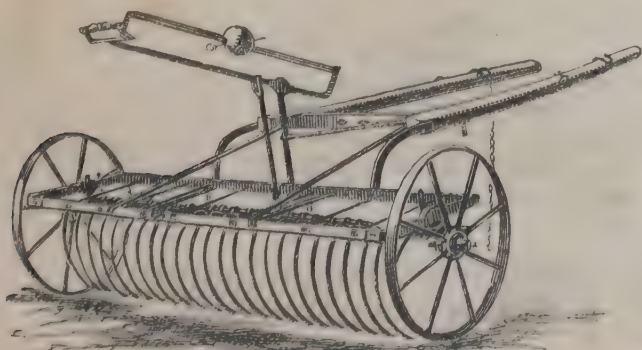
HORSE HOE, improved and manufactured by the exhibitor; of very simple construction, and great strength; made entirely of wrought-iron.

Price £1 5 0

GRUBBER, improved and manufactured by the exhibitor. Chiefly used for working between the rows of potatoes, turnips, &c.; it is very light and strong, and fitted with an extra set of tines, to work as a horse hoe.

Price £2 5 0

RYE-GRASS DRILL, improved and manufactured by the exhibitor, and fitted with a new slide invented by him, and is warranted to sow every kind of seed with the greatest regularity, and without clogging. It is the only implement that can be depended on for sowing with certainty and regularity. Price £3 10 0



LEVER HORSE RAKE.

LEVER HORSE RAKE, improved and manufactured by the exhibitor, fitted with the oval tooth and the sliding balance ball, both of which are the invention of the exhibitor, and much approved. It is constructed wholly of wrought-iron, firm and strongly made, and is well suited for exportation. Price £6 0 0

GAPPING DRILL, invented by Mr. John Phillips, of Brockton, Newport, and manufactured by the exhibitor. Most useful for sowing seeds in rows, when liable to be injured by the fly, &c. Price £0 8 6

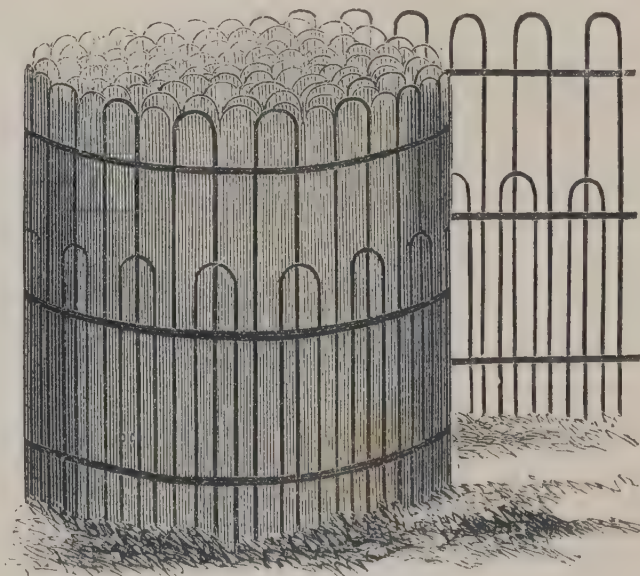
CHEESE PRESS, invented by Henry Bruckshaw and manufactured by the exhibitor; it is simple, strong, and durable, occupies small space, has no levers, weights, or wheels, as those in ordinary use; it is easy to manage, not liable to get out of order, and well adapted for exportation. Price £2 0 0

WROUGHT-IRON COW CRIB, improved and manufactured by the exhibitor, 4 ft. square; it is well made, strong, and handsome. Price £1 10 0

IRON CATTLE TROUGH, manufactured by the exhibitor, 3 ft. square. Price £1 0 0

CAKE BREAKER, invented and manufactured by the exhibitor; a most compact and effective implement, occupying small space, and the only one of its kind where both sets of rollers are adjustable.

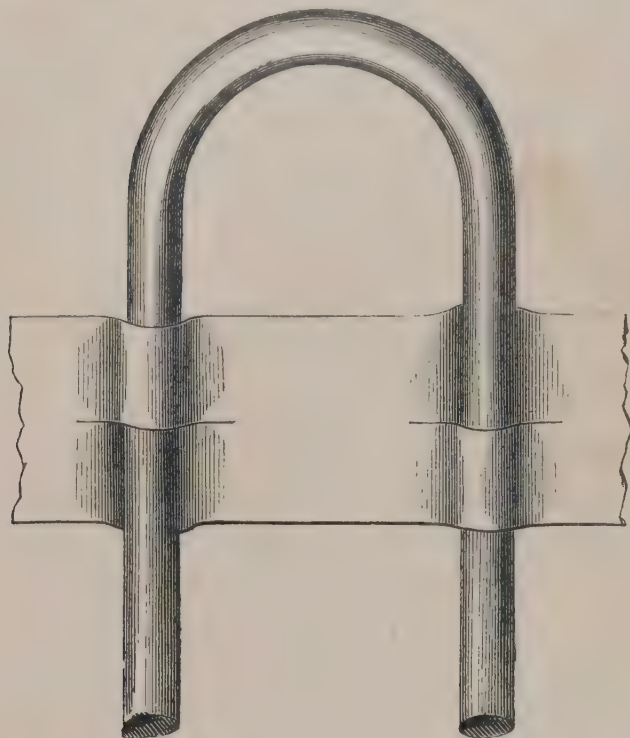
Price £4 10 0



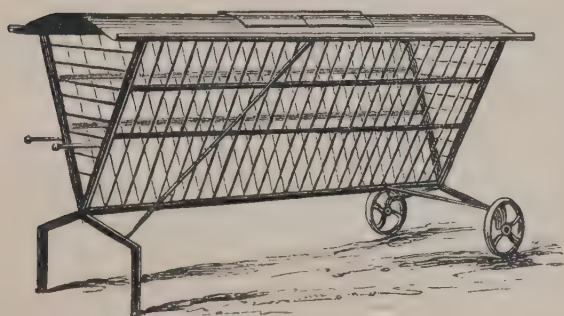
ROLL OF FENCE.

SPECIMENS OF IRON FENCES—game, poultry, sheep, park, tree, &c.—invented, patented, and manufactured by the exhibitor. This is a most compact and light style of fencing, and the mode of connecting the horizontal bars with the vertical rods is original, (*see illustration*); the horizontal bars are notched by machinery, and the whole forms the strongest, most compact, and durable fence ever offered to the public; it is easily fixed, and if broken by accident, simple to repair; it packs closely, and is neat when fixed. It is strongly recommended for exportation. Price, from 6d. to 5s. per yard.

UNDERHILL, W. S., *continued.*

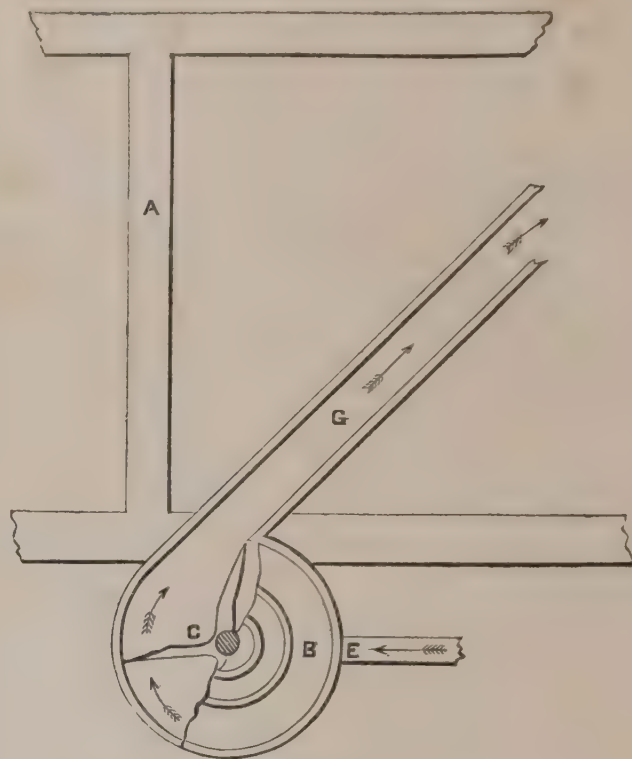


CONNEXION OF FENCING BARS AND RODS.



SHEEP RACK.

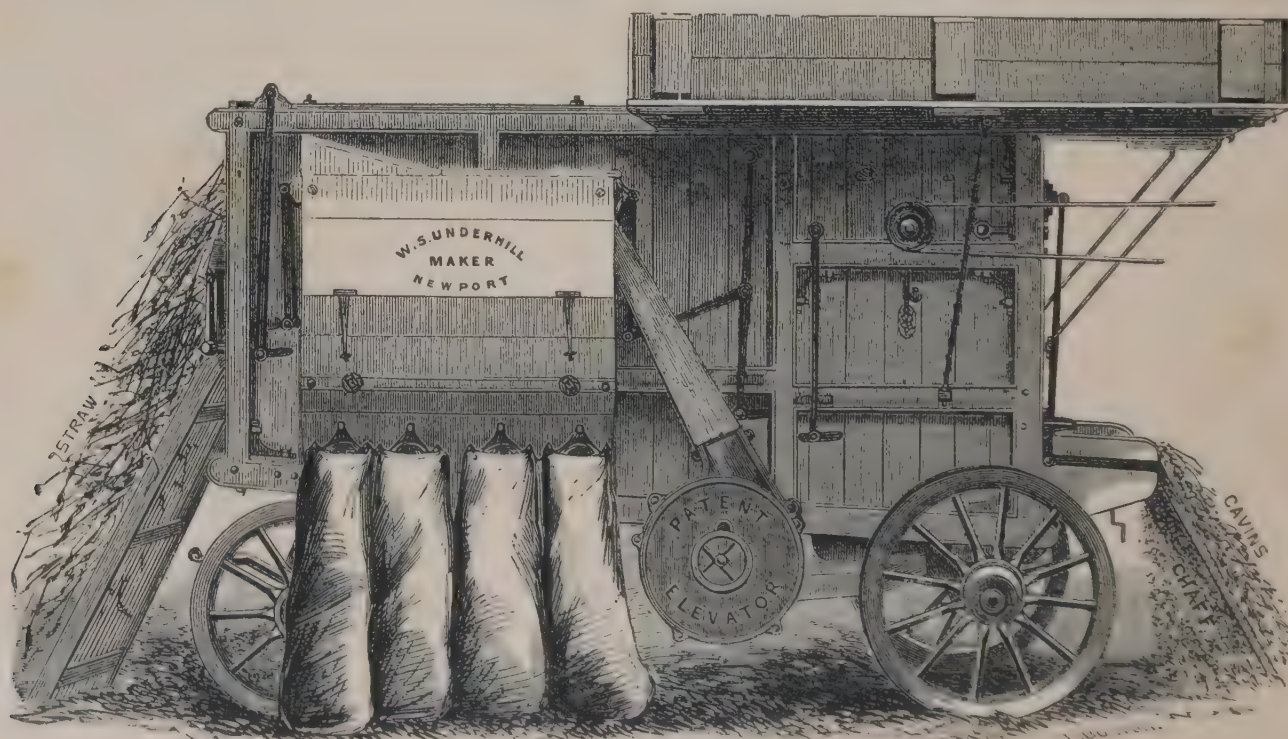
PATENT SHEEP RACK, invented and manufactured by the exhibitor, made wholly of wrought-iron, and mounted on wheels as shown in illustration. This is the cheapest article of the kind ever offered, and has had a silver medal awarded at the Leeds Show of the Royal Agricultural Society. Price £1 10 0



GRAIN ELEVATOR.

PATENT GRAIN ELEVATOR. This is a new implement, invented and patented by John and Henry Bruckshaw, and W. S. Underhill, of Newport, and manufactured by the exhibitor. It is applicable for raising grain in mills, corn stores, or unloading grain vessels, and will lift any quantity of grain in any required direction, and when applied to a thrashing machine acts as elevator, barley peeler, and smutter. It requires to be seen at work to be fully appreciated. Amongst its advantages over the ordinary tins are—that it dresses the corn in its passage to the separating screen, and when applied to thrashing machines, dispenses with half the ordinary number of straps and pulleys, and can be fixed to any machine of any maker.

A is the main frame of the machine; B the case of the elevator; C the flyers or blades fixed on the fan shaft E of the first winnowing machine, and in any other more convenient position.

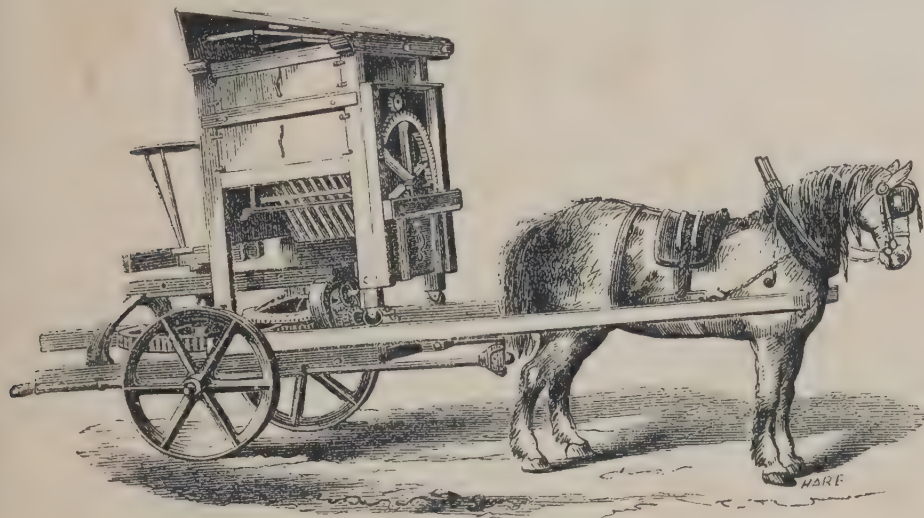


THRASHING MACHINE.

THRASHING MACHINE, improved and manufactured by the exhibitor, fitted with every known improvement,

including the patent grain elevator. It finishes the grain ready for market. Price, complete . £100 0 0

WALLIS & HASLAM, *Basingstoke*.—2-horse and 3-horse portable thrashing machines flour mill, ploughs, harrows, patent spherical bearings.



TWO-HORSE POWER PORTABLE THRASHING MACHINE.

	Fixture.	Portable.
	£ s.	£ s.
4-horse power, if with a separate 2-wheel carriage for the conveyance of the barn-work or thrashing part, extra		4 10
4-horse power, with 54-in. barn-work, and a separate 2-wheel		

1. 2-HORSE POWER PORTABLE THRASHING MACHINE, loaded for travelling with patent spherical bearings and wrought-iron drums, and breasting and patent beaters.

The 4-horse power machine, similar to this, but stronger, obtained the Royal Agricultural Society's first prize of £20 at the Canterbury meeting, in 1860. These machines are made very strong, and are well adapted for exportation. The prices and sizes are as follows:—

	Fixture.	Portable.
	£ s.	£ s.
1 h.p. with 18-in. barn-work	26 0	30 0
2 ditto 24-in. ditto	35 0	40 0
3 ditto 30-in. ditto	41 10	48 10
4 ditto 42-in. ditto	51 0	58 10

carriage for the barn-work when made portable	£55 0	67 10
An additional draft pole to any of the above machines, complete with fittings to adapt them for countries where the horses are small, extra	1 10	1 10



2. THREE-HORSE POWER PORTABLE THRASHING MACHINE, on 4 wheels.

This machine has been designed to meet the requirements of those purchasers who prefer a machine which can be set down for work without being taken off the travelling wheels. It requires no fixing, the wheels being merely let into the ground 3 or 4 inches. It is shown fitted with a pole, as used in the south of Russia and some other parts, but may be had fitted with shafts at the same price. Two sizes of this class of machine are made, viz.:—

3 horse power, with 30-in. barn-work . . .	£50 0
4 ditto with 42-in. ditto . . .	60 0
4 ditto with 48-in. ditto . . .	62 0
4 ditto with 54-in. ditto . . .	64 0

An additional draft pole to either of the above machines, complete with fittings, to adapt them for countries where the horses are small, extra 1 10

3. PORTABLE FLOUR MILL, with a pair of 3-ft. stones, fitted complete with fast and loose driving pulleys. These mills have a strong cast-iron frame, which carries

the stones above it, and contains the necessary gearing inside. They are made in parts, which are carefully fitted together so as to be easily taken to pieces for packing and transport. Those fitted with 2 ft. 6 in. stones, and smaller, may be had either with pulleys or with a universal joint to adapt them to be driven by horse-power gear-works.

4. IRON PLOUGH adapted for general purposes on light land, fitted with 1 wheel and steel breast, marked W.H.B. Price, with cast-iron breast £3 7 6

5. IRON PLOUGH, adapted for general purposes on both light and heavy land, fitted with 2 wheels and patent screw stumps, to allow the man to alter the depth without stopping, and with steel breast, marked W.H.F. Price, with cast-iron breast £4 17 6

Extra to either if with steel breast 0 7 6

6. PATENT EXCELSIOR HARROWS, marked X10. Price, per set of 3, with whippetree £4 4

7. SET OF SELF-RELIEVING CHAIN HARROWS, 5 ft. wide, and 7½ ft. long. Price complete £2 5

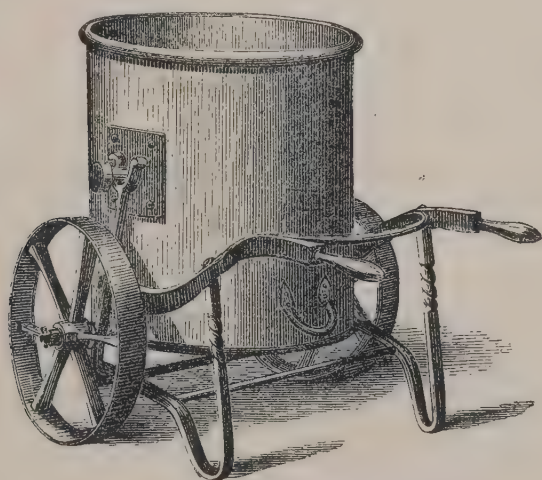
8. PAIR OF PATENT SELF-ADJUSTING SPHERICAL BEARINGS.

WARNER, JOHN, & SONS, *Crescent, Cripplegate, London.*—Garden engines, pumps, syringes, fountains, fumigators for graperies, &c.

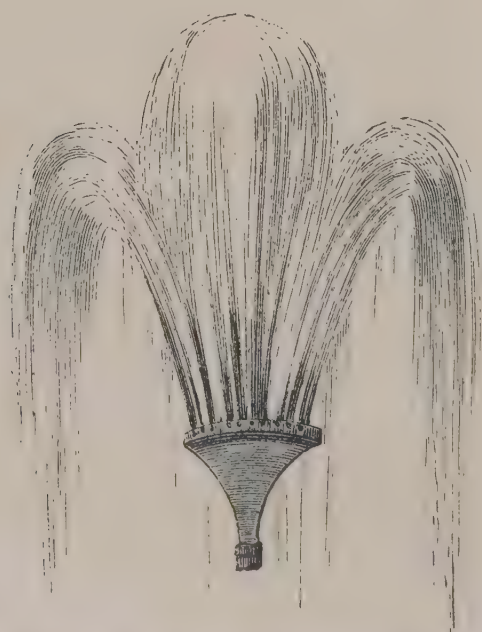
Obtained Prize Medal at the Great Exhibition, 1851.



No. 547. WARNER'S OAK OVAL TUB GARDEN ENGINE, with registered spreader.
These engines, in oak tubs, are made to hold either 14 or 24 gallons; in galvanized iron tubs, 10, 16, or 24 gallons.



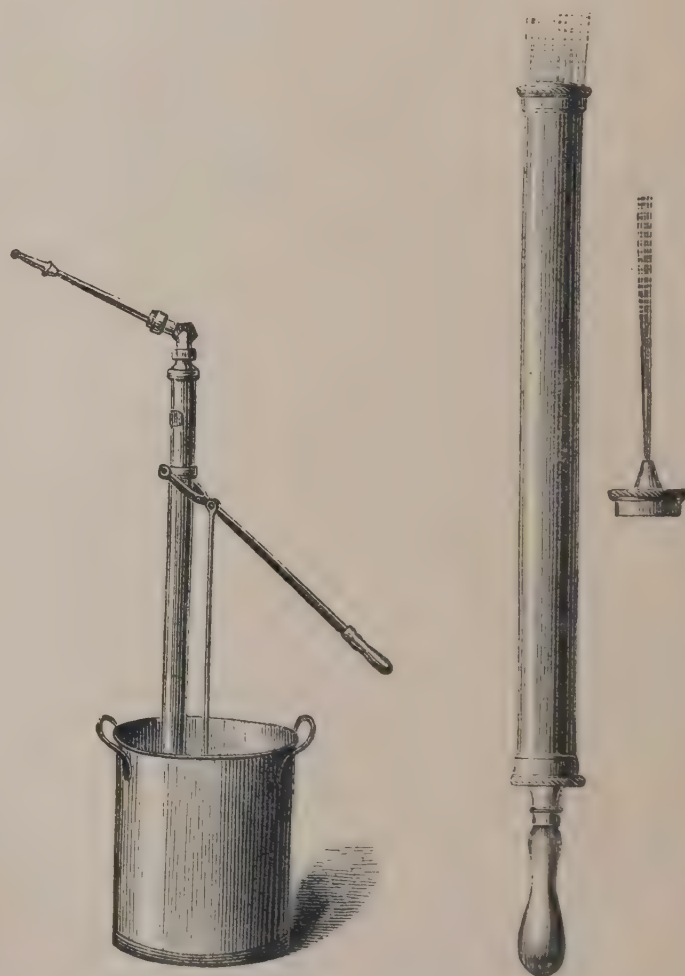
No. 579½. WARNER'S IMPROVED SWING WATER BARROW to hold 35 gallons.
By its use the gardener will save much time and labour where much watering is done with the water-pot.



No. 585. FOUNTAIN DESIGN—Prince of Wales' feathers.



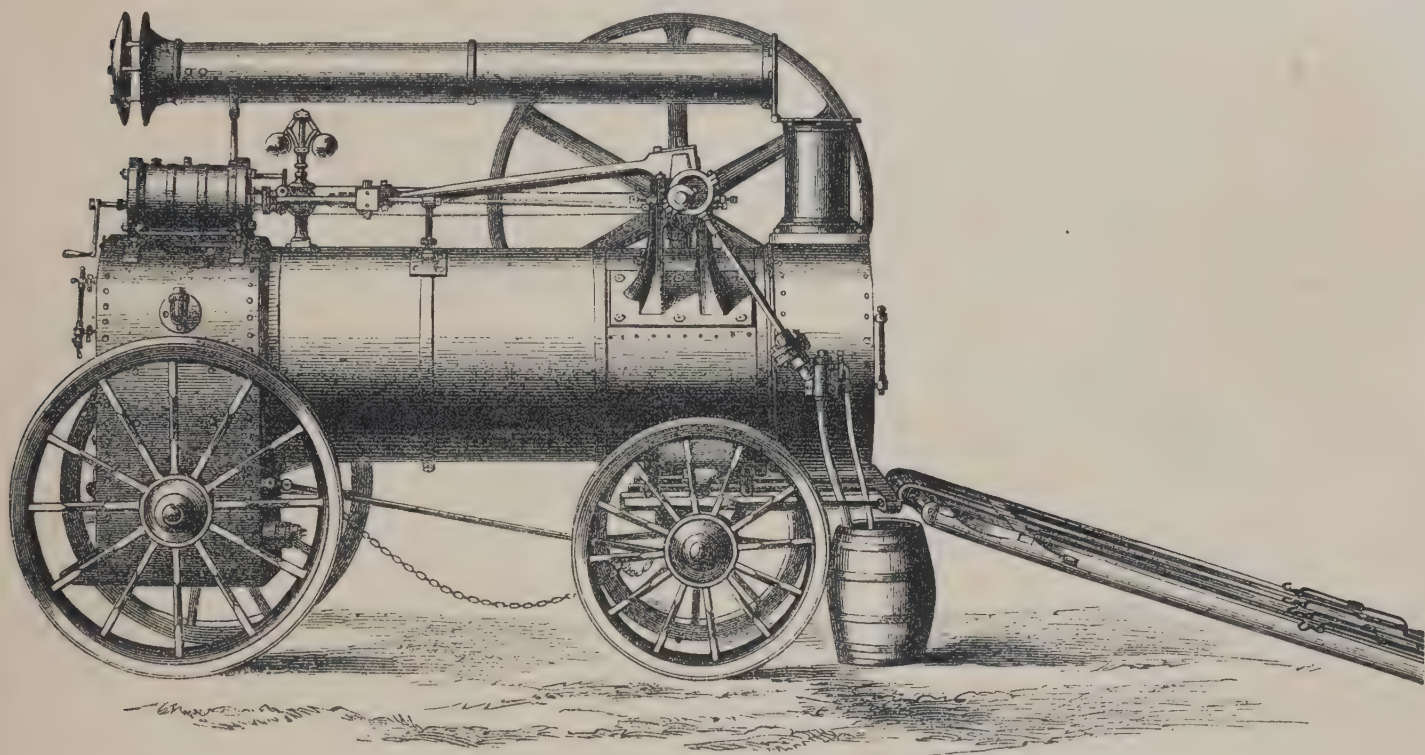
No. 587. FOUNTAIN DESIGN—mushroom pattern.



No. 546. WARNER'S GARDEN ENGINE, recommended for orchard houses and conservatories.
A large variety of fountain designs for lawns or conservatories can be seen at the manufactory.

BRASS SYRINGES of various sizes for greenhouses.
Illustrated and priced catalogues may be obtained by application.

WILKINSON, WRIGHT, & Co., *Boston, Lincolnshire.*—Steam engines, thrashing machines, stacking machines or straw carriers, saw tables.



PORTABLE STEAM ENGINE.

The above illustration represents a PORTABLE STEAM ENGINE, with horizontal cylinder and ordinary tubular boiler, as manufactured by MESSRS. WILKINSON, WRIGHT, & Co.; the workmanship is of first-rate

quality, and in the engine will be found to contain all the latest improvements.

The above engine is of 7 horse-power. Price . . £200



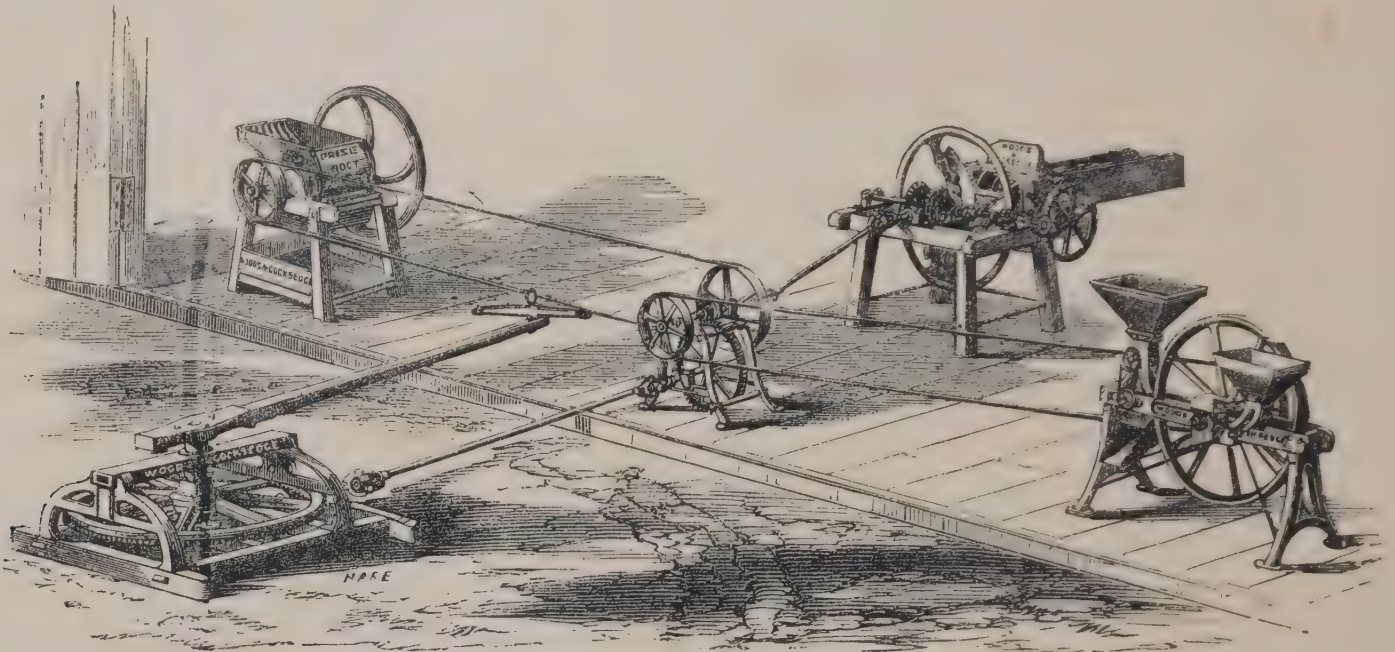
PATENT PRIZE STACKING MACHINE OR STRAW CARRIER.

The silver medal was awarded to this implement at the Royal Agricultural Show at Leeds, 1861; also the silver medal at Mecklenburgh Schwerin, 1861.

This implement is applicable to stacking hay, straw,

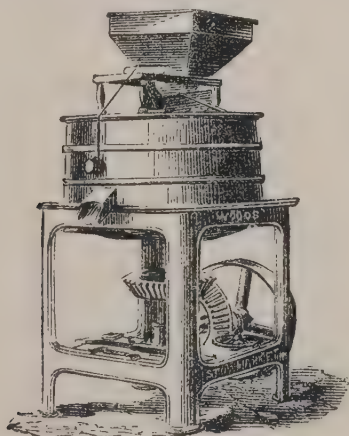
or other similar produce. May be worked by hand, horse, or steam power, will carry the material to be stacked to any reasonable distance or height, and in any direction. Price, with a range of 15 yards and 30 ft. high £31 10

WOODS & COCKSEGE, *Suffolk Iron Works, Stowmarket.* New iron horse-gear, grinding mills pulper, &c.



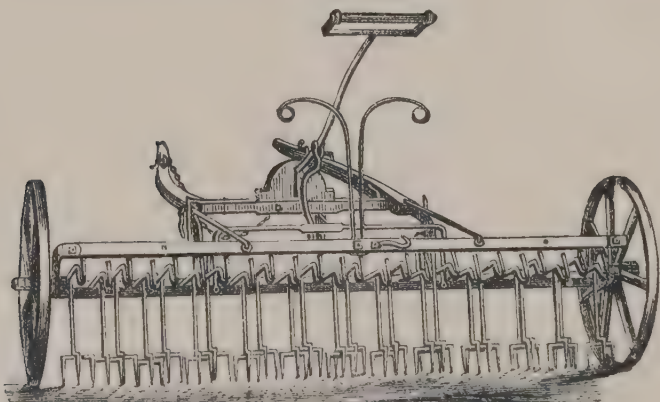
IRON PRIZE HORSE-GEAR.

NEW IRON PRIZE HORSE-GEAR, fixed for driving agricultural and other machinery. Price . . . £13 13
The above sketch represents W. & C.'s new iron horse-gear, fixed for driving a chaff engine, prize root pulper, and crushing and grinding mill, &c.



CORN-GRINDING MILL.

PORTABLE CORN-GRINDING MILL, fitted with French burr stones for grinding agricultural produce, 20 in.
Price, £21 to £75 0
ROLLER CRUSHING AND GRINDING MILL, for crushing oats, barley, linseed, malt, and also for grinding or splitting beans, peas, Indian corn, &c.
Price, £5 15s. to £13 13

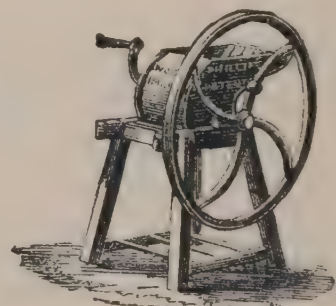


PHILLIPS' PATENT POPPY AND WEED EXTIRPATOR.

PHILLIPS' PATENT POPPY AND WEED EXTIRPATOR AND LEVER HARROW, for exterminating poppies and other

weeds, for passing over root crops, and harrowing in small seeds. Obtained 2 silver medals of the Royal Agricultural Society of England, and several special prizes.
Price £8 15 0

IMPROVED OIL-CAKE BREAKERS, breaks 2 sizes.
Price £3 7 6



PATENT ROOT PULPER.

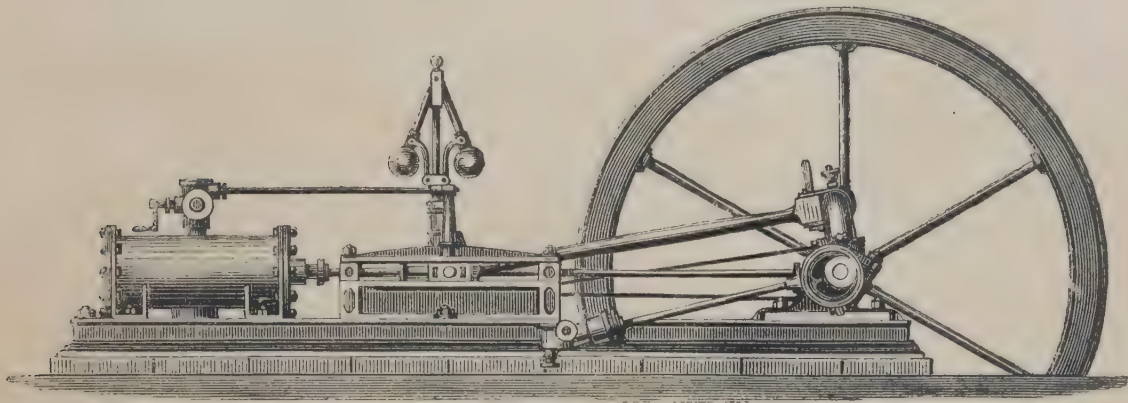
IMPROVED PATENT ROOT PULPER. Awarded several first prizes of the Royal Agricultural Society. Price for hand-power £4 15 0
This implement when fixed to horse or steam-power will pulp into a fine regular mince 5 to 7 tons per hour.

MODELS.

SALISBURY FIRST-PRIZE AGRICULTURAL CART for general purposes. Price £15 10 0
MITCHELL'S NEW PATENT COMBINED HARROW, SEED DRILL, AND HORSE HOE. Price, £7 to . . . £15 0
NEW STEEL'D TEETH HORSE RAKE, &c.
Price £6 15 0

The celebrated SALISBURY FIRST-PRIZE GENERAL PURPOSE CART; the body made of the best seasoned English timber, oak bottom, and thick plank sides, strongly bolted together. The harvest frames are made with strong wrought-iron joints, to take to pieces. The wheels are made with every recent improvement, of the best dry well-seasoned timber. The arms and axles are of the best scrap iron, fitted with caps, and are warranted. Price. £15 10 0

HAYWOOD, JAMES, JUN., *Phoenix Foundry, Derby*.—Cast-iron ornamental vases and chairs.



STATIONARY STEAM ENGINE

Manufacturer of stationary steam engines of all sizes, from two-horse power upwards, with or without expansive gear; steam boilers and boiler fittings; portable steam engines and combined thrashing machines, of two, three, and four-horse power, the first ever constructed of these sizes to thrash, winnow, and bag the corn in one operation; patent combined thrashing and finishing machines, to prepare the corn ready for market; improved portable grinding mills, with either French or Grey stones, from 18 in. to 48 in. diameter; flour-dressing machines; improved chaff cutters, with wood or iron frames, constructed to pack in small space for exportation; improved horse gear, made entirely of iron; every description of saw machinery; liquid manure and other pumps.

FOUNDRY DEPARTMENT.

Light and heavy castings of every description; wrought and cast iron roofs, bridges, girders, and tanks, and every kind of smith's and founder's work in general; railway

chairs, switches, and crossings; machinery and sugar mill castings; windows, stoves, cooking ranges; cast-iron ornamental vases and chairs, and other ornamental castings. The contracts executed at these works comprise some of the largest railway bridges in the kingdom, including the one over the Westminster Road, London, on the South Western Railway, which is 90 feet span; a great number of iron roofs for railway stations; many covered markets, including the one at Manchester, which is the largest in England; the whole of the iron roofing and castings required in the erection of the Enfield Small Arms Factory; and other important works.

James Haywood, Jun. much regrets that Her Majesty's Commissioners were unable to afford space for the exhibition of his machinery in the International Exhibition; specimens will be found in the Agricultural Department at the Crystal Palace, Sydenham; and at the Royal Agricultural Society's Show, to be held in London in June.



APPENDIX TO CLASS IX.

GARRETT, RICHARD, ET FILS, *Leiston Works, Suffolk, Angleterre.*—Propriétaires, fabricants et exporteurs des plus éprouvées machines agricoles.

Ont reçu la médaille du Conseil en 1851, la médaille d'honneur en or à Paris en 1855, et la médaille en or de première classe à Vienne en 1857, aussi 50 médailles en or et en argent des différentes sociétés agricoles de l'Europe, comme les représente la montre illustrée de R. G. et fils. R. G. et fils ont d'ailleurs reçu un unique nombre de prix d'argent se montant à £1,200, et des recommandations presque sans limites.

FONDÉ EN 1778.

La raison de RICHARD GARRETT et FILS sollicite l'attention de la noblesse, des propriétaires et des fermiers de toutes nations (qui désirent l'amélioration de l'agriculture) pour leur machines et instruments aratoires comme exposés dans Classe No. 9, et qui l'on trouvera construits d'après les maximes les plus scientifiques et d'une fabrication du premier rang, assisté par les applications mécaniques les plus nouvelles pour faciliter le travail en bois et métaux, quels matériaux sont tous choisis avec égard à la plus grande solidité, ce que peuvent apprécier le mieux ceux, qui ont dernièrement visité leur fabrique.

R. G. et fils invitent respectueusement tous ceux, qui aient le désir de faire leur jugement sur une base saine, de profiter de la commodité, qui présente à présent le chemin de fer par les comtés de l'est, pour une telle visite, qui ne manquera pas d'occasionner leur patronage d'instruments et de machines d'une fabrication si supérieure et si parfaitement finis.

Les machines et les instruments fabriqués par R. G. et fils peuvent être vus en fonction pratique sur le ferme, qui est annexée à la fabrique et avoisine la station du chemin de fer de Leiston.

La demande, qui c'est répandue et s'augmente rapidement par toute l'Europe pour les machines à battre à vapeur (pour les perfectionnements desquelles cette raison à Leiston Works a pendant le dernier demi-siècle continuellement tenu le premier rang) leur fit voir la nécessité de la production d'une machine, qui serait capable d'achever, d'une manière plus simple et efficace, les opérations nécessaires pour préparer le blé et rendre l'échantillon propre et parfait pour vente, tout ce que

fait à présent leur machine combinée à battre et nettoyer, dont le catalogue illustré de R. G. et fils contient une description, par un seul procès, sans déchet et avec très peu d'ouvrage manuel.

Richard Garrett et fils exposent aussi leur instruments et machines types bien connus, savoir:—Machines à vapeur portatives et fixes, Machines à battre à manège, Machines à nettoyer le grain, Moulins à moudre, Semoirs et Houes à cheval, qui sont adaptés pour toutes les méthodes de culture, et dont ce catalogue donne une brève description. On peut obtenir des catalogues détaillés avec des renseignements complets sur le transport par eau, et des devis du prix de livraison à toutes parts du monde, en s'adressant à Leiston Works ou à leur place dans Classe No. 9 de l'exposition internationale.

En conséquence des connexions étendues de cette fabrique l'on envoie des cargaisons entières par bâtiments affrétés directement de la fabrique à beaucoup des ports principaux de l'Europe, et par cet arrangement les acheteurs épargnent les grandes dépenses, qui résultent ordinairement de l'emballage et des frais casuels d'embarquement, et les machines sont livrées en bon état. L'on envoie aussi sur demande, à une dépense modique, un homme capable d'instruire dans l'emploi et le maniement des machines.

On peut obtenir des Catalogues en Anglais et différentes langues étrangères franco, aussi des plans, des dessins et des calculs des machines fabriquées par R. G. et fils en s'adressant à leur place dans Classe No. 9, ou directement à Leiston Works, Suffolk.

Garrett Richard und Sohn, Leiston Works, Suffolk, England. — Patent Inhaber, Fabrikanten und Ausführer der erprobtesten Landwirthschaftlichen Maschinen.

Erhielten die Council-Medaille in 1851, die goldene Ehren-Medaille in Paris, 1855, und die goldene Medaille erster Classe in Wien, 1857, nebst 50 goldenen und silbernen Medaillen der verschiedenen landwirthschaftlichen Gesellschaften Europas, wie sie R. G. und Sohns illustrirter Aushängebogen darstellt. R. G. und Sohn haben ausserdem noch eine beispiellose Anzahl Geldpreise, £1,200 betragend, nebst zahllosen Empfehlungen erhalten.

Gegründet im Jahre 1778.

Die Firma Richard Garrett und Sohn erlaubt sich die Aufmerksamkeit der Edelleute, Gutsbesitzer und Landwirthe aller Nationen (die sich für die Verbesserung des Ackerbaues interessiren) auf ihre in Classe No. 9 ausgestellten Maschinen und Geräthe zu lenken, welche man nach den wissenschaftlichsten Prinzipien gebaut und auf's Vollkommenste gearbeitet finden wird, unterstützt durch die neuesten mechanischen Anwendungen zum Erleichtern der Arbeit in Holz und Metallen, welche Materialien alle mit Rücksicht auf größt mögliche Dauerhaftigkeit auserlesen sind; dies werden aber Diejenigen am besten schätzen können, welche vor Kurzem ihre Werkstätten besucht haben.

R. G. und Sohn laden auf's Höflichste alle Diejenigen ein, welche ihr Urtheil auf einer gesunden Basis zu bilden wünschen, sich der Bequemlichkeit zu bedienen, welche die Gi-

senbahn der Ost-Provinzen jetzt für einen solchen Besuch gewähren, der nicht fehlen kann zur Begünstigung von Geräthen und Maschinen solcher vorzüglichen Fabrication und vollkommenen Arbeit Veranlassung zu geben.

Alle von R. G. und Sohn gefertigte Maschinen und Geräthe können auf dem an die Fabrik und Leiston Station grenzenden Pachtthofe in praktischem Betriebe gesehen werden.

Das sich über ganz Europa weit verbreitete und schnell zunehmende Begehr für Dampfdreschmaschinen (in welcher Branche diese Firma zu Leiston Works für Verbesserungen während des letzten halben Jahrhunderts fortwährend den Vorrang gehalten hat), hat sie von der Nothwendigkeit überzeugt eine Maschine zu erzeugen, welche auf einfachere und wirksamere Weise die zur gehörigen Zubereitung des Korns und zum Hervorbringen eines reinen und vollkommenen

Musters, zum Verkauf, nöthigen Operationen ausführen könne, und dies geschieht jetzt durch einen einzelnen Prozeß, ohne Vermüstung und mit sehr wenig Handarbeit, mittelst ihrer combinirten Dresch- und Reinigungs-Maschine, welche in R. G. und Sohns illustrirtem Cataloge beschrieben steht.

Richard Garrett und Sohn stellen ebenfalls ihre wohlbekannten Normal-Geräthe und Maschinen aus, nämlich:—Transportirbare und feststehende Dampfmaschinen, Göpel-Dreschmaschinen, Kornreinigungsmaschinen, Mahlmühlen, Säemaschinen und Pferdehacken, welche allen Arten von Anbau angemessen sind und in diesem Cataloge beschrieben stehen. Umständliche Cataloge mit vollständiger Auskunft, betreffend Verschiffung und Anschläge der Lieferungskosten nach irgend einem Theile der Welt, sind zu haben, wenn man sich an ihre Fabrik in Leiston, oder ihren Stand, in Classe No. 9 der Ausstellung aller Nationen wendet.

In Folge der ausgebreiteten Verbindungen dieser Fabrik finden Verschiffungen ganzer Ladungen Statt, mittelst Schiffe, welche direct von der Fabrik aus nach vielen der Haupthäfen Europas befrachtet werden, und diese Einrichtung erspart ihren Kunden die schweren Kosten, welche gewöhnlich aus Verpackung und zufälligen Verladungskosten entstehen, und sichert dabei die Lieferung der Maschinen in einem unverdorbenen und vollkommenen Zustande; wenn man es wünsche, wird auch gegen billige Berechnung ein sachkundiger Mann gesandt, um in dem Gebrauche und der Handhabung der Maschinen zu unterrichten.

Illustrirte Cataloge, auf Englisch und in verschiedenen fremden Sprachen, sind frei zu haben, auch Pläne, Zeichnungen und Kostenanschläge der von R. G. und Sohn gefertigten Maschinen, wenn man sich an ihren Stand in Classe No. 9, oder direct an Leiston Fabrik, Suffolk, wende.

GARRETT, RICHARD, OG SÖN, *Leiston Works, Suffolk, England*,—Patenthavere, Fabrikanter og Exporteurer af de meest sogte Agerdyrkningsmaskiner.

Erholdt Council-Medaillen i 1851, Guld-Æresmedaillen i Paris 1855 og Guldmedaillen af første Classe i Vien 1857, samt 50 andre Guld- og Sølv-Medailler fra de forskjellige Agerdyrknings-Selskaber i Europa (see R. G. og Söns illustrerte Ark).—R. G. og Sön have desforuden erholdt et uhört Antal af Pengepræmier, der beløbe sig til £1,200, og talløse Anbefalinger.

ANLAGT I AARET 1778.

Firmaet RICHARD GARRETT og SÖN anmoder Adelsmænd, Landeiere og Landmænd af alle Nationer (der maatte interessere sig for Agerdyrknings Fremgang) om at skjenke deres i Classe No. 9 udstilte Maskiner og Redskaber, deres Opmærksomhed, hvilke man vil finde construerte efter de videnskabeligste Principer og af fortrinligt Arbeide, understøttet af de nyeste mekaniske Anvendelser for at lette Forarbeidelsen af baade Træ og Metaller, alle hvilke Materialier blive udsøgte med Hensyn til yderst mulig Varighed, hvilket de ere bedst istand til at vurdere, som have for kort Tid siden besøgt deres Fabrik.

R. G. og Sön indbyde ærbødigt alle de, som maatte ønske at bygge deres Omdømme paa en sund Basis, til at benytte sig af Leiligheden, som "Eastern Counties" Iernbanen nu yder for et saadant Besøg, der ikke kan andet end formaa dem til at begunstige Redskaber og Maskiner af saa udmærket Fabrikation og fuldkomment Arbeide.

Alle de Maskiner og Redskaber, som R. G. og Sön forfærdige, kunne sees i praktisk Brug paa Avlsgaarden, der staaer i Forbindelse med Fabbrikken og støder op til Leiston Iernbane-Stationen.

Den over hele Europa vidt udsprede og hurtigt tiltagende Efterspørgsel om Damp-Tærskemaskiner (for hvis Forbedring dette Firma i Leiston bestandig har holdt Forrangen gjennem det sidste halve Aarhundrede) drev dem til at indsee Nödvendigheden af at frembringe en Maskine, der var simplere og virksommere i Udövelsen af de nödvendige Operationer for at tilberede Kornet og frembringe en reen og fuldkommen Pröve for Salg,

og dette fuldbringes nu in en eneste Proces og med meget lidet Haandarbeide ved Hjælp af deres kombinerede Tærsk- og Rensemaskine, der staaer beskrevet i R. G. og Söns illustrerte Catalog.

Richard Garrett og Sön udstille ogsaa deres velbekjendte Mönster-Redskaber og Maskiner, nemlig bevægelige of faste Dampmaskiner, Tærskemaskiner med Hesteværk, Rensemaskiner, Malemöller, Saaemaskiner og Hestehytter, der passe for al Slags Dyrkning og ere beskrevne i denne Catalog. Udförlige Cataloger med omstændelig Underretning om Udslibning, samt Overslag over Omkostninger for Aflevering overalt i Verden, kunne erholdes, naar man henvender sig til "Leiston Works" eller til deres Stade i Classe No. 9 paa International-Udstillingen.

Som Følge af denne Fabriks udbredte Forbindelser, finde Udslibninger Sted i hele Ladninger med Skibe, der befragtes umiddelbart fra Fabrikken til mange af Europas fornemste Havne; dette sparer dens Kunder de svære Udgifter, de ellers i Almindelighed paadrage sig for Pakning og tilfældige Indskibningsomkostninger, og sikkrer desuden Maskinernes Aflevering i sund og fuldkommen Tilstand, og ifald det skulde være nödvendigt, kan en kompetent Mand blive sendt, imod moderat Betaling, for at give Underviisning i Brugen og Behandlingen af de respektive Maskiner.

Illustrerte Cataloger paa Engelsk og i forskjellige fremmede Sprog kunne erholdes frit, ogsaa Planer, Tegninger og Beregninger, R. G. og Söns Maskiner vedkomme, naar man henvender sig til deres Stade i Classe No. 9 eller umiddelbart til "Leiston Works" Suffolk.

GARRETT, RICHARD, É HIJO, *Leiston Works, Suffolk, Inglaterra*.—Autorizados con patente, fabricantes, y exportadores de la maquinaria de agricultura, con todas las ultimas y mas recientes mejoras.

Obtuvieron la Medalla del Consejo en 1851; la Medalla de Oro de Honor, en Paris 1855; y la Medalla de Oro de Primera Clase, en Viena 1857; como tambien 50 Medallas de oro y de plata de las diversas Sociedades de Agricultura de Europa, como consta de su Carton Ilustrado. Ademas las dichas medallas, R. G. é Hijo han recibido un numero sin ejemplo de premios en dinero, del importe en junto de £1,200, y encomios casi ilimitados.

ESTABLECIDOS A.D. 1778.

La casa de Richard Garrett é Hijo, llaman la atencion de los Senores Proprietarios, y Agricultores de todas las naciones (que quieran mejorar la agricultura), a sus maquinas é utensilios que se exponen en la Clase No. 9,

los cuales se hallarán contruidos segun los principios mas cientificos, de trabajo de primera calidad, con el auxilio de los medios mecanicos mas modernos para facilitar la fabrica en madera y metales. Sus materiales son escogidos para asegurar la mayor durabilidad, cosa que podran confirmar aquellos que han inspeccionado recientemente sus Fabricas.

R. G. é Hijo invitan á los Senores que quieran satisfacerse por medio de una inspeccion personal, á que se valgan de las facilidades que les ofrece el Ferro Carril Eastern Counties, cuya Estacion de Leiston está muy proxima de sus Fabricas. Los Senores Visitadores hallarán en las mismas, utensilios y maquinas todo de primera clase y perfeccion; y paraque su inspeccion sea mas satisfactoria, se podrá ver en operacion y actividad de servicio, en la Tierra que esta junta á los Talleres y unida á la Estacion de Leiston todas las maquinas é utensilios de la fabrica de R. G. é Hijo.

Como la demanda en toda la Europa para Maquinas de Vapor para trillar está ahora tan extendida y siempre en aumento, y como la casa de R. G. é Hijo á Leiston Works ha tenido constantemente la precedencia durante medio siglo, tocaron la necesidad de producir una maquina mas simple y efectiva en hacer todas las operaciones precisas para separar el grano de la paja, y convertirlo en una muestra limpia y perfecta para el mercado. Esto se hace ahora por un proceso, sin desperdicio ninguno, y con poquisimo trabajo manual, por medio de su Maquina combinada para Trillar y Preparar como se describe en el Catalogo Ilustrado.

R. G. é Hijo exponen tambien los utensilios y maquinas reconocidas que siguen, á saber: Maquinas de Vapor locomobiles y fijas, Maquinas para Trillar con fuerza de caballos, Maquinas para preparar Grano, Molinos para Muler, Taladros, Azadas trabajados por caballos, ajustadas para todos los metodos de cultivacion y que se describen en las paginas del Catalogo. El mismo Catalogo, con todos los detalles y particularidades con respecto al embarque, y los presupuestos de gastos de entrega en todas las partes del mundo, podran obtenerse en Leiston Works ó al mostrador de los Fabricantes, Clase 9, en la Exposicion Internacional.

Por motivo de las muchas relaciones de los Fabricantes, se hacen consignaciones de sus articulos, en cargos redondos y completos por buques que se fletan directamente de los talleres para muchos de los Puertos principales de Europa. Por este medio, sus clientes no tienen que hacer los fuertes gastos que hay que hacer ordinariamente para gastos de embalage y otros incidentes á la navegacion, y la maquinaria se entrega, con mas seguridad, en una condicion sana y perfecta. Ademas, si es menester, se puede mandar, con pocos gastos, un artesano competente para enseñar á otros el uso y el modo de hacer trabajar las maquinas.

Catalogos Ilustrados, en lengua Inglesa y otras extranjeras, se obtienen gratis; como tambien, los Planos, Diseños y Aprecios de la Maquinaria de Richard Garrett é Hijo en su Mostrador en la Exposicion Internacional, Clase 9, ó directamente de su Establecimiento, Leiston Works, Suffolk.

GARRETT, RICHARD, E FIGLIO, *Leiston Works, Suffolk, Inghilterra*.—Patentati, fabbricanti, ed esportatori della più perfezzionate macchine d' agricoltura.

Ottennero la Medaglia del Consiglio in 1851; la Medaglia d'Oro d'Onore di Parigi in 1855; e la Medaglia d'Oro di Prima Classe, di Vienna in 1857; come pure 50 medaglie d'oro e d'argento dalle diverse Società Europee d'Agricoltura, indicate nella Carta Illustrata dei medesimi. Oltre di queste, R. G. e Figlio hanno ricevuto Premj in denaro che ammontano alla somma complessiva di £1,200, e commendazioni quasi senza limite.

STABILITI IN 1778.

La casa di Richard Garrett e Figlio ha l' onore di richiamare l' attenzione dei Sigri. Proprietari di tutte le Nazioni (i quali s' interessano nell' agricoltura) alle sue macchine ed utensili che si espongano nella Classe No. 9. Si troveranno i medesimi fabbricati secondo i principi più scientifici, di lavoro di prim' ordine, dietro i mezzi meccanici più moderni onde facilitarne la manifattura tanto del legno che dei metalli; e coloro che hanno esaminato recentemente le sue Fabbriche sapranno dire che i materiali di cui si serve sono scelti per le loro durevoli qualità.

R. G. e Figlio pregano i Sigri. amatori i quali desiderano formarne un giudizio, di valersi della commodità che offre loro la Ferrovia Eastern Counties; ed i Fabbricanti rimangono persuasi della preferenza che sarà accordata alle lor macchine, dopo tale ispezione in conseguenza della superiorità della manifattura e della perfezione delle medesime.

Tutte le macchine ed utensili della Fabbrica de' Suddetti potranno vedersi in operazione sui Terreni attigui alle Fabbriche, e contigui pure alla Stazione della Ferrovia di Leiston.

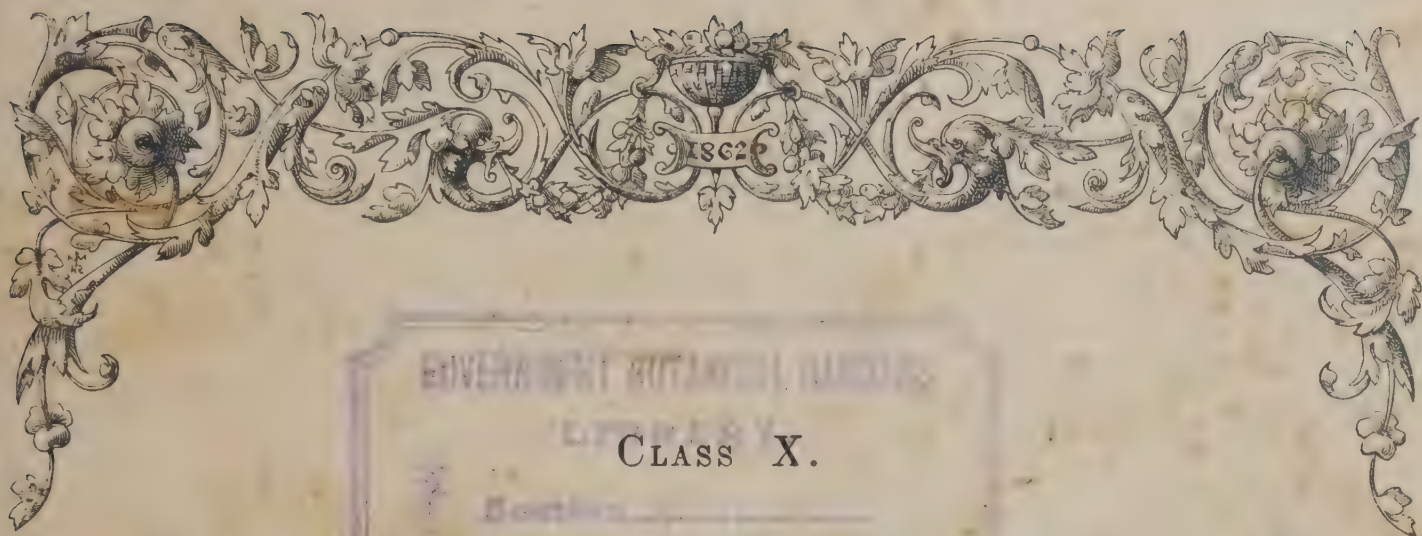
Il favore che sempre più godono in Europa i Trebbiatoj a Vapore (pei quali, durante mezzo Secolo, la Casa di R. G. e Figlio ha avuto la più grande riputazione) ha imposto loro la necessità di produrre una Macchina, più semplice ed efficace ad eseguire tutte le operazioni necessarie onde estrarre il Grano dalla Paglia, e renderlo pulito ed atto alla vendita. Questo si effettua adesso per via de

un solo processo, senza guasto, e con pochissimo lavoro manuale, dalla sua macchina complessiva da trebbiare e preparare, come si troverà descritta nel suo Catalogo.

I medesimi Fabbricanti espongono pure le loro Macchine a Vapore locomobili e fissi, Trebbiatoj a forza di Cavalli, Macchine da Preparare il Grano, Molini da Maccinare, Succhielli, e Zappi da Cavallo; che si adattano a tutti i metodi di coltivazione e che si descrivono con tutti i dettagli nei Cataloghi. Questi ultimi, come pure le notizie necessarie quanto alla Spedizione, e Stima delle spese di consegna in tutti i paesi, potranno ottenersi a Leiston Works, oppure alla loro mostra all' Esposizione Internazionale, Classe 9.

Per ragione delle relazioni estese dei Fabbricanti, le consegne si fanno in esclusive cariche, da vascelli noleggiati direttamente dalle Fabbriche a diversi dei Porti principali di Europa, e in tal modo risparmiano ai loro clienti le forti spese in che s' incorrono generalmente per l' imballaggio e l' spedizione delle medesime; garantisce poi la consegna delle macchine in uno stato sano e convenevole; e al bisogno viene mandato un uomo capace con poca spesa onde insegnare ad altri l' uso e modo di usare le macchine.

I Cataloghi Illustrati, in Inglese ed in Lingue Straniere, si danno gratis; e si possono ottenere alla mostra dei Sigri. R. G. e Figlio, Classe 9, oppure alle lor Fabbriche, Leiston Works, Suffolk, Piani, Disegni, e Valutazioni delle loro Macchine.



CLASS X.

CIVIL ENGINEERING, ARCHITECTURAL, AND BUILDING
CONTRIVANCES.

SUB-CLASS A.—*Civil Engineering and Building Contrivances.*

[2226]

ALGER'S PATENT FURNACE COMPANY (Limited), 4 *Victoria Street, Westminster*.—Model of an elliptical blast furnace, now erected at Stockton-on-Tees, and in blast.

The advantage which the elliptical blast furnace possesses over other furnaces, consists in its combining large capacity with that degree of narrowness which insures the horizontality of the lines of equal temperature from the tuyères upwards. Thus the whole of the ore arrives in a uniform state of preparation for fusion at a melting zone, possessing perfect uniformity of temperature. The quality of the iron is improved, the descent of the charge

more uniform, and there being *two* openings for tapping, one at each end of the ellipse, the furnace is more under control, and bridging, or scaffolding, is greatly diminished. There is a saving of one-third in the cost of construction, one-third in the fuel; less labour is required, and there is, besides, a saving in the blowing. Any ordinary blast furnace can be altered to the elliptical form at a small expense.

[2227]

ALLEN, EDWARD ELLIS, 5 *Parliament Street, S.W.*.—Corrugated fibrous sheets for roofing, partitions, &c.

[2228]

ALLEN, H., 17 *Percy Street, W.*.—Double model: a lift for manufactory; ditto for private house.

1. Model of a lift for raising or lowering invalids to the different floors of a house with ease and comfort.

2. The same adapted for raising or lowering goods at a factory or warehouse.

[2229]

ARBRUTH, G. B., & THOS. SCOTT, 18 *Parliament Street*.—Models of iron armour for ships and forts.

[2230]

ARCHITECTURAL POTTERY COMPANY, THE, *Poole, Dorset*.—Mosaic, tessellated, and white glazed tiles; patent glazed bricks; and orange-tree tile-tubs.

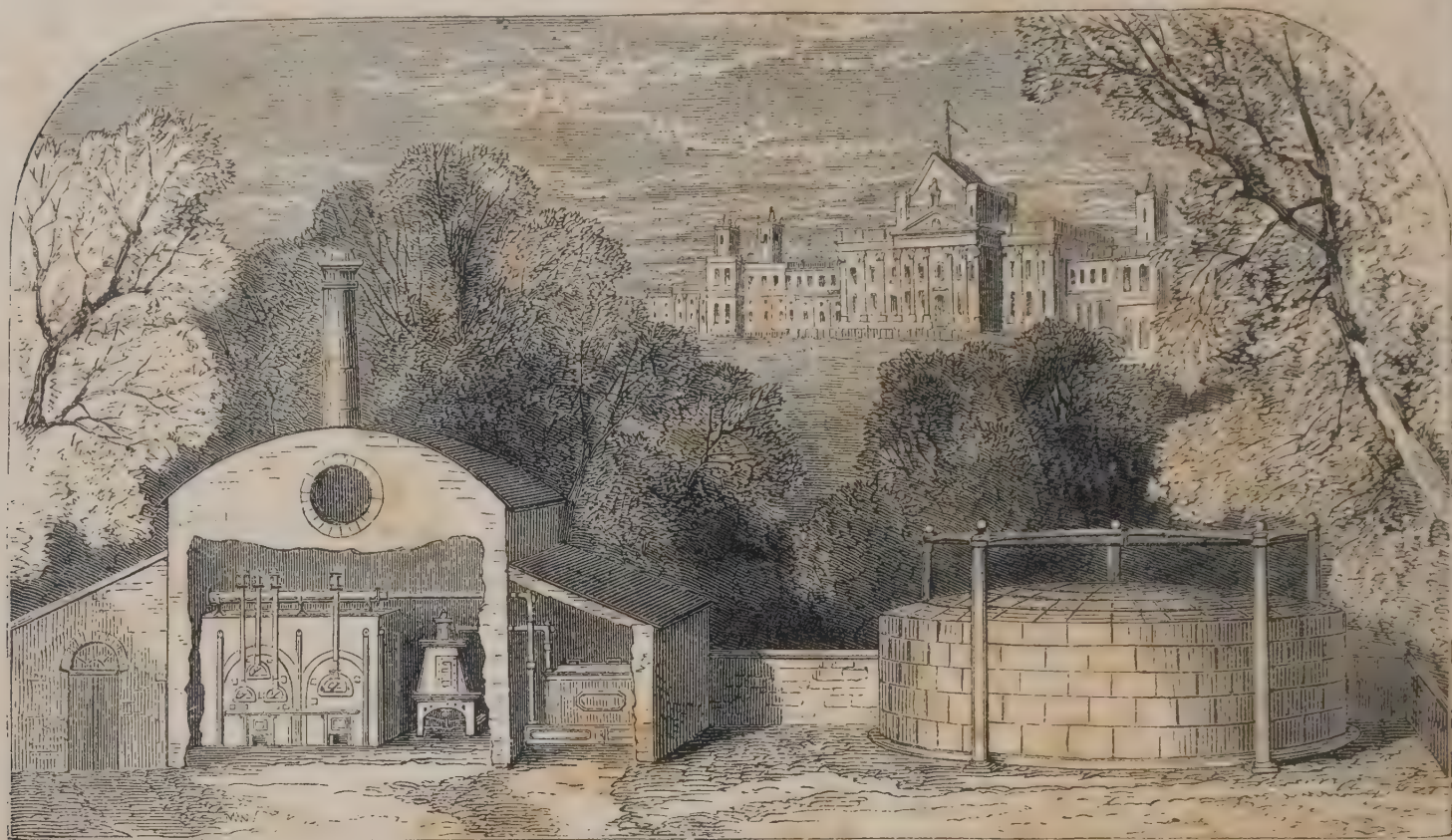
[2231]

ASHBY, ROBERT, 34 *Smith Street, Chelsea, S.W.*.—Model for fireproof building.

[2232]

ATKINSON, W., 1 *Victoria Street, London*.—Portland cement.

BOWER, GEORGE, *St. Neots, Huntingdonshire.*—Patented vertical gas apparatus and combined purifier, for private use, and for exportation.



GAS APPARATUS AT BLENHEIM.

Of the numerous inventions which have so pre-eminently distinguished the present age, none has contributed in a greater degree to the comforts of civilised life than that of illumination by gas.

In these days of its almost universal adoption in our cities and towns, it is quite superfluous to dilate on its numerous advantages, which must be manifest to all, though their full force can perhaps be appreciated only by those who can remember the sombre appearance formerly presented by the streets of our large towns at night, as contrasted with their present brilliant aspect.

There is, however, a still more extended field for the operations of gas lighting, and much yet remains to be done in our villages, and in the mansions and private residences of the nobility and gentry. It is believed that this is due to certain misapprehensions and not unnatural prejudices which have hitherto existed on the subject, and that when these can be effectually removed, gas lighting will no longer be, in a great measure, confined to cities and towns, but its advantages will be as widely appreciated and embraced as they undoubtedly deserve to be. Its non-introduction into many of our villages has been mainly owing to the belief that it would prove a commercial failure, whereas it has been most conclusively shown by experience, that any compact village of a thousand inhabitants may be lighted with gas, so as to pay a good per-centage on the original capital embarked.

It is only within a comparatively recent period that the prejudices of private gentlemen, as to the advisability or practicability of introducing gas into their dwellings, have been partially removed. By some, danger was contemplated; by others, it was regarded as a nuisance, or as too complex in its management and manufacture; others, again, shrank from it on the score of economy, as involving fearful outlay in plant, and large cost of maintenance; while the possessor of the ornamental

domain imagined in such plant an unsightly structure, emitting dense smoke and noxious vapour, giving to the mansion the appearance of a manufactory, and altogether inconsistent with that picturesqueness and quiet which are so generally and justly appreciated in country life. These suppositions are, however, an entire fallacy, for it may be confidently stated, that science has completely removed all ordinary chance of danger, or possibility of nuisance; that on the score of economy, in regard to the cost of apparatus, and the method and expense of making the gas, much has been done to reduce and overcome objections; whilst, by judicious arrangements, and the use of a portable apparatus (such as the one exhibited, which, from its compactness, can be placed in any out-building), nothing calculated to offend the eye, or the most fastidious taste, can be objected to. For works of greater magnitude, a low and secluded position (hidden it may be by trees and shrubbery), is usually chosen; and the requisite buildings may be so designed as to combine the ornamental with the useful.

The above engraving represents the patented apparatus as erected and fixed by the exhibitor for the palace of his Grace the Duke of Marlborough, at Blenheim.

Mr. Bower's inventions, designed for the purpose of removing the objections here alluded to, have been extensively adopted in various parts of Great Britain and the Continent, the following being a list of 100 gas works selected out of a great number of cities, towns, villages, factories, public buildings, and private establishments which have been lighted by him during the past few years. It may be mentioned as a proof of their general applicability, that the necessary apparatus for lighting the railway tunnel now in course of construction under Mont Cenis, has recently been supplied by him for the Italian Government.

BOWER, GEORGE—*continued.*

CITIES, TOWNS, AND VILLAGES.

Bourn.....Lincolnshire, remodelled.
 Beaufort.....Breconshire.
 Bishop's Castle. Salop.
 Bolsover.....Derbyshire.
 CaistorLincolnshire.
 Casale.....Piedmont.
 Crickhowell.....South Wales.
 Coalville.....Leicestershire.
 Collingham ... Nottinghamshire.
 Donnington ... Lincolnshire.
 DokkumThe Netherlands.
 GefleSweden.
 Higham Ferrars. Northamptonshire.
 Hatfield.....Hertfordshire.

Harlingen.....The Netherlands.
 Irthlingboro' ..Northamptonshire.
 King's Cliffe...Northamptonshire.
 Kimbolton.....Huntingdonshire.
 March.....Cambridge, remodelled.
 Middleham ... Yorkshire.
 MilvertonSomersetshire.
 Mountsorrel ... Leicestershire.
 Oakham.....Rutland, remodelled.
 Purmerende...The Netherlands.—Plant
 PottenBedfordshire. [only.
 QuorndonLeicestershire.
 RedbournHertfordshire.
 ReptonDerbyshire.

Red HillSurrey.
 Saffron Walden. Essex, remodelled.
 San Sebastian. Spain.
 Sandy.....Bedfordshire.
 St. IvesHunts, remodelled.
 St. NeotsHunts, remodelled.
 StevenageHertfordshire.
 Swineshead ... Lincolnshire.
 Spa.....Belgium.
 SystonLeicestershire.
 Wellingborough. Norths., remodelled.
 Whittlesea ... Cambs., remodelled.
 WhitwickLeicestershire.
 WigstonLeicestershire.

FACTORIES, RAILWAY STATIONS, AND COLLIERIES.

Abersychan	South Wales	Iron Works.
Allen, J., Esq.	Ivy Bridge, near Plymouth	Paper Factory.
Barrow, R., Esq.	Staveley	Three Coal Pits.
Bolckow and Vaughan	Middlesboro'-on-Tees	Iron Works.
Bayer and Co.	Sourabaya, Dutch East Indies... ..	Sugar Works.
Bolckow and Vaughan	Eston, near Stockton	Iron Works.
Brown, Humphrey, Esq.	Tewkesbury	Silk Factory.
Brymbo Iron Company... ..	Near Wrexham	Iron Works.
Cocker and Sons... ..	Hathersage, near Sheffield	Needle Factory.
Castelli, M.	Serravalle, Italy	Cotton Factory.
Combe and Co.	Wolvercott, near Oxford	Paper Mill.
Ebbw Vale Company	Near Newport, Monmouthshire.	Iron Works.
Gordon, J., Esq.	33, New Broad Street, London	For Export.
Harrison, Ainslie, and Co.	Lyndal, Lancashire	Iron Works.
Hepburn and Sons	Dartford	Tannery.
Italian Government	Montcalier	State Railway Station.
Lausdorff, The Count	St. Petersburg	Cotton Mill.
Moscow Sugar Factory Company	Moscow	Sugar Works.
Mancardi, S., Esq.	Turin, Piedmont... ..	Silk Mill.
Midland Railway Company	Toton, Nottinghamshire	Siding and Station.
Metallic Works Company	St. Petersburg	General Metal Works.
Milne, H. B., Esq.	Gefle, Sweden	Saw Mill for Gas from saw dust.
National Silk Spinning Company	Novara, Piedmont	Silk Mill.
Russian Spinning Company	St. Petersburg	Cotton Mill.
Rignon and Co.	Savigliano, Piedmont	Silk Mill.
Sampson Mill Company	St. Petersburg	Cotton Mill.
Schipoff and Co.	Moscow	Cotton Mill.
Smith and Sons	Watford, Hertfordshire	Paper Mill.
Gilineshoff, S. W., Esq.	St. Petersburg	Spinning Mill.
Shute, Thomas, Esq.	Watford, Hertfordshire	Silk Mill.
Saunders, Thomas, Esq.	Dartford	Paper Mill.
Towgood, Messrs., Brothers	St. Neots	Paper Mill.
Towgood, Alfred, Esq.	Helpstone, Peterborough	Paper Mill.
Treschow, T., Esq.	Lorwig, Norway	Iron Works.
Tzarskoe Railway Company	St. Petersburg	Gardens and Railway Station.
Taylor and Robinson	Rastrick, Huddersfield	Woollen Mill.
Tunnel under Mount Cenis	Bardoneche	Italy.
Vitale, Placido, Esq.	Messina	The New Theatre.
Whalley and Hardman	Kirkham, near Preston	Cotton Factory.

PRIVATE ESTABLISHMENTS.

Marlborough, His Grace the Duke of, Blenheim Palace,
 Woodstock, Oxfordshire.
 Westmoreland, Right Honourable the Earl of, Apthorpe
 Park, Wansford, Lincolnshire.
 Roden, Right Honourable the Earl of, Tollymore Park,
 County Down, Ireland.
 Macclesfield, The Right Honourable Lord, Sherborn Castle,
 Oxfordshire.
 Ashby, Captain, Nazeby Woolleys, Northamptonshire.
 Bolckow, J., Esq., Marton Hall, near Middlesborough.
 Benyon, Rev. E. R., Culford Hall, Bury St. Edmunds.
 Benyon, R., Esq., M.P., Englefield, Reading.
 Fothergill, R., Esq., Abernant House, Aberdare.

Gwyn, Howell, Esq., Dyffryd House, Neath.
 Harter, Rev., Cranfield Court, Newport Pagnell.
 Haigh, G. H., Esq., Grainsby Hall, near Louth, Lincoln-
 shire.
 Ledeboer, J., Esq., Macassar, Dutch East Indies.
 Newton, Geo., Esq., Croxton Park, Cambridgeshire.
 Pearce, J. D. M., Esq., M.A., Craufurd College, Maiden-
 head.
 Roden, R. B., Esq., Ponty Moil, South Wales.
 Stevens, Rev. T., St. Andrew's College, Bradfield, near
 Reading.
 Vaughan, John, Esq., Middlesboro'-on-Tees.
 Vansittart, S. H., Esq., Bisham Abbey, Maidenhead.

In reference to illuminating gas it is noticeable, that though many articles, such as oil, peat, resin, &c., readily produce it, the exhibitor and patentee fearlessly asserts, that, after innumerable experiments, and the trial of almost every conceivable plan for generating artificial light, our coal mines furnish the best and most economical materials for the purpose. For, as the illuminating

power of gas depends on the relative proportions of its constituents—carbon and hydrogen—and as these are found to exist in coal in the proper proportions, it is obvious that taking into consideration its low cost, and the simplicity of the means required to convert the volatile portion of it into gas, coal is the best substance for the purpose. It is true, for instance, that water,

BOWER, GEORGE—*continued.*

which is costless, will produce an illuminating gas when decomposed, and its hydrogen liberated and carbonised, but the cost of decomposition for the production of hydrogen—one only of the elements of which it is composed—is actually greater than that of highly illuminating gas produced from coal; and notwithstanding the many attempts to supersede it, it may be emphatically stated, that nothing whatever can in any commercial sense compete with coal, even giving it a range of price far beyond what it is at present.

Having established this fact, it became necessary to devise a cheap, simple, and economical apparatus, and the result has been the exhibitor's inventions, patented in 1852, 1859, and 1860; the last of which (the vertical retort), in connection with the combined purifying apparatus, has been pronounced far superior to all others, in every essential property requisite for the manufacture of gas on a small scale.

These features may be noted in the articles exhibited, viz., the vertical retort or gas generator, with its appurtenances, and the combined hydraulic main, condenser, and purifier, being equal in their conjoint capacity to a power representing about twenty lights. (The gasholder cannot be exhibited, for want of space.)

The gas generator consists of a conical retort, set vertically in an iron case, lined with fire-brick; both ends of such retort are open, the top being surmounted by a hopper, for the purpose of charging it with coal, to be afterwards closed by a luted plug, and the bottom provided with a luted door, having a false bottom or diaphragm projecting about six inches into the retort. This door, when closed, is retained in its position by means of a lever, having a swing catch and wedge; the fire-grate being arranged around the retort, so as to bring the fire itself into immediate contact with its outer surface. The mode of operation is, to heat the retort to a bright red, the bottom door being then luted, and raised to its proper position by means of the lever and catch; the retort is next filled, by the use of the hopper, with the necessary charge of dry coal or cannel, and the top closed with the luted plug. After the lapse of three or four hours, the gas will be extracted, the wedge and catch may be removed, and the door lowered by the lever to the pair of horizontal bars; and being removed, the

coke falls out leaving the retort free for renewed operations.

The combined purifying apparatus consists of the hydraulic main, condenser, and purifier, united in one vessel or case, the base of which forms the hydraulic main; and a receptacle for the products, separated from the gas by the condenser, which condenser is so formed that the gas passes around the purifying vessel, in a space, the inner surfaces whereof are exposed to the water, forming the lute or seal for the purifying lid; and the outer surfaces are exposed to the atmosphere.

The purifier is provided with a cover, and four tiers of shelves, or perforated plates, which, when in operation, are covered with lime, and through which the gas percolates.

The gas is brought from the retort by means of a pipe into the hydraulic main, thence passing up and down the spaces forming the condenser, into the purifier, and from thence it is conveyed into the gasholder, ready for use.

The principal advantages of these arrangements for private works on a small scale are:—

1. They occupy but little space, are very simple, and require but little labour or skill to manage.

2. No bricks are required to set the retort, further than the few sent with the apparatus, and these are moulded of suitable shapes.

3. The retort being set vertically, and surrounded by fire, in immediate contact with it, requires less fuel than if set horizontally, and the fire may be lighted and permitted to go out with impunity, the same as an ordinary shop or hall stove.

4. It is adapted for common coal as well as cannel, and may also be adapted for the generation of gas from wood, peat, or oil, in situations where coal is difficult to be obtained.

5. In this arrangement of retort, by merely removing the top and bottom covers, when red-hot, the current of air that passes through, will remove all deposits of carbon from the interior.

6. The whole of the apparatus for removing impurities from the gas by condensation and purification, which by the ordinary process consists of three or four separate and cumbrous vessels, is effectually combined in the limits of one solid base.

7. The retort, when worn out, can be replaced, without requiring a skilled workman to fix it.

[2233]

BALE, T. S., *Mount Pleasant, Newcastle, Staffordshire.*—Mosaic and ornamental floor, wall tiles, and glazed bricks.

[2234]

BARNETT, S., *23 Forston Street, Hoxton.*—Diving apparatus.

[2235]

BARRETT, HENRY, *12 York Buildings, Adelphi.*—Model of fireproof flooring.

[2236]

BASFORD, WILLIAM, *Elgreave Street, Burslem.*—Front-facing brick, in connection with walls or fronts of cottages, and other buildings; roof and floor tiles, &c.

[2237]

BEART'S PATENT BRICK COMPANY, *Arsley, and King's Cross, London.*—Bricks and agricultural drain pipes.

[2238]

BELLMAN & IVEY, *14 Buckingham Street, Fitzroy Square, W.*—Specimens of various imitations of scagliola marble.

[2239]

BETHELL, JOHN, *38 King William Street, London, E.C.*—Specimens of creosoted woods.

BROWN-WESTHEAD, MARCUS, *Manchester*.—Patent hoist governor and patent safety railway platform lift.

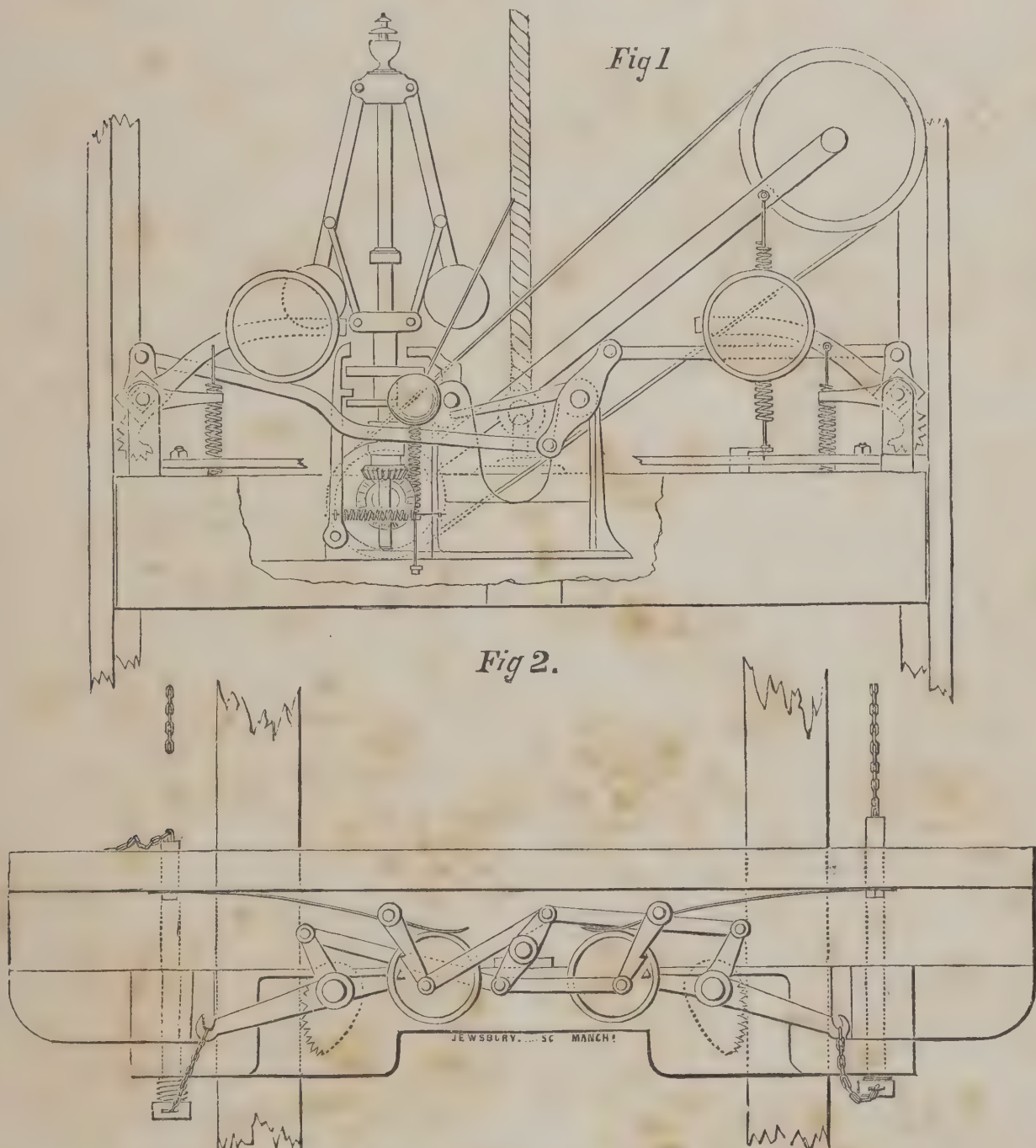


Fig. 1 represents a patented apparatus used in the northern districts of England for preventing accidents to life and injury to property in hoisting and lifting machinery. The machine is attached to the upper side of the ascending and descending chamber or cage. It is simple in construction and easily kept in order, and has already proved itself in many instances to be a secure and efficient apparatus for the purpose intended. It is evident that no matter what the cause of the cage or box travelling at too great a speed, the expansion of the governor from an excessive rate of motion must, per force, operate upon the other portions of the machine, and thus permit the cams or wedges to be instantly projected against the uprights or guides of the shaft or well-hole, and so arrest the box. A small weighted lever falls if the rope of suspension is severed, and thereby catches the box, or cage, within a few inches, and that instantaneously. This is a double security in the event of the rope breaking, as the machine, in that case, does not depend upon the action of the governor alone. It has been proved that the greater the weight of the cage, or box and its contents, the more safely it is secured; for the heavier the load the greater will be the resistance of the cams, as they will take a much firmer hold of the

guides or uprights. Some alteration of the plan, as shown in Fig. 1, makes this invention equally applicable to the cages used in coal and other mines, where it is essential that the momentum of the cage should be gradually reduced in the event of over-speed. This invention combines the peculiar and important advantage, viz., the springs to insert the cams are not brought into action except at the required time, thereby preserving their elasticity unimpaired. The cost of application to ordinary hoists ranges from £25 to £30, including royalty.

Fig. 2 is a plan for preventing accidents to railway platform lifts. These hoists are extremely dangerous in consequence of the liability of one or more of the suspending chains breaking. By this invention the platform is evenly and simultaneously arrested at its four corners in the event of one or all of the suspension chains being fractured, by too great a load, or from the alternations of temperature affecting unequally the nature of the metal employed in the manufacture of the chains. It is, moreover, advantageous in its application, as the platform can be readily adjusted or repaired whenever requisite without having to stay the platform. Cost of application, including royalty, £75 to £85.

BRUNEL, ISAMBARD, *Duke Street, Westminster*.—Models of Saltash and Chepstow bridges, designed by late Mr. Brunel.

MODEL OF BRIDGE ON THE SOUTH WALES RAILWAY OVER THE WYE AT CHEPSTOW.

This bridge was designed by the late Isambard Kingdom Brunel, Esq., D.C.L., F.R.S., Engineer of the Railway. It is constructed for a double line, and consists of three side spans of 100 feet each, and one principal span over the river of 300 feet. Each roadway over the land openings is carried between a pair of wrought-iron girders. The intermediate piers each consist of three hollow cylinders of cast-iron, six feet in diameter, filled with concrete. Each roadway over the main opening is carried between a pair of girders of similar construction, 300 feet long, which are supported at the extremities by the piers, and at four intermediate points—two at twelve feet, and two at sixty-two feet—from the centre, where they are attached to two sets of suspension chains, which form the tensional parts of a pair of rigid trusses. In these trusses, the tension delivered by the suspension chains is received by a straight tube of plate-iron, of circular section, nine feet in diameter; which is supported at its extremities on the superstructure of the piers, with its centre fifty feet above the line of rails, and at two intermediate points by vertical struts raised from the suspension chains at the points sixty-two feet from the centre of the span where the girders are attached to them. Rigidity is given to the structure by diagonal chains extending from the top of each strut, to the foot of the other. Each tube where it rests on the eastern pier is carried by a system of rollers, to allow of the expansion and contraction caused by changes of temperature. The weight of iron in each truss is 460 tons. The pier supporting the western end of these trusses consists, up to the level of the roadways, of six cast-iron cylinders similar to those which carry the land spans, and which here penetrate the rocky gravel of the river bed to the rock at eighty feet below high water spring tides. Above the roadway the pier is also of cast-iron, forming two archways, one for each roadway, over which the tubes of the respective trusses rest. The eastern pier is of masonry resting on the rock a few feet below the level of the line of rails. The form of this pier above the roadway is similar to that of the cast-iron pier at the western end. The bridge was commenced in April, 1850, and was completed in three years. On the successive completion of each tube, it was temporarily rendered rigid with chains, and being placed at right angles to the river, one end was supported on pontoons, and the other on a rolling truck. The pontoons were then drawn across the river by warps from the opposite shore. The tube was next lifted into its place on the top of the piers by chain purchases, and the rest of the truss was then completed. The operation of floating was rendered difficult by the great rise and fall of the tide, which is forty-two feet at spring tides. The contractors for the iron work were Messrs. Finch and Willey, of the Windsor Foundry, Liverpool. The total cost of the bridge was £77,000.

MODEL OF THE ROYAL ALBERT BRIDGE ON THE CORNWALL RAILWAY OVER THE TAMAR AT SALTASH.

This bridge was also designed by the late Mr. Brunel. It is for a single line, and consists of two spans of 455 feet each over the river, and seventeen land openings of spans varying from ninety to seventy feet. The land openings—of which there are ten on the Cornwall, and seven on the Devonshire side—form curved viaducts

leading to the main spans. Throughout the structure, at a level of one hundred feet above high water, the rails are laid on a ballasted platform of planks carried on cross girders between pairs of plate-iron girders. In the viaducts, the ends of the girders rest on piers of limestone masonry, each pier consisting of two square pillars which spring from a common base, and are united at the top. In the main spans the girders are supported by trusses, in principle analogous to those at Chepstow; but here the tubes which resist the tension of the suspension chains are in section elliptical instead of circular, and in general profile, curved instead of straight, the rise of the curve, being equal to the drop of that of the chains; thus the weight of the girders and roadway rests half on the tube, half on the chains, the girders being carried by vertical struts, placed at intervals of forty feet, diagonally braced so as to give rigidity, and by intermediate attachments to the suspension chains. The weight of iron in each truss is 1,070 tons. The substructure of the piers at the shore ends of the main spans is of granite masonry and brickwork. That of the centre pier consists at the base of a granite pillar thirty-five feet in diameter, resting on a rock foundation eighty-six feet below high water mark, and built to a height of ten feet above it, from which rise four hollow octagonal columns of cast-iron, built up in segments bolted together internally, and which carry the girders on an entablature above their capitals. The superstructure of each pier consists of an archway through which the trains pass, and over which the ends of the tube are carried. The superstructure of the centre pier is of cast-iron, and of the shore piers of masonry with a casing of cast-iron. The shore ends of the tubes are carried on rollers, to allow of expansion and contraction. The centres of the ends of the tube are thirty-six feet above the roadway, and the extreme depth of the truss is sixty-two feet. The lower part of the centre pier, which was the chief difficulty in the construction of the work, was built in a cofferdam or cylinder of plate-iron, thirty-seven feet in diameter and ninety feet in length, closed at the top, strongly stayed throughout, and having its bottom divided into compartments, which were kept clear of water partly by a supply of compressed air, partly by pumping. This cylinder was correctly placed on the rock through the mud which was there, thirteen feet in depth, and which being loaded with shingle ballast, assisted to keep out the water. Each truss was put together on the Devonshire shore of the river. Docks were formed, and pontoons prepared with wooden framings to carry the truss. Warps were led from these pontoons to various points on shore, and to vessels moored in the stream. The operation of floating in each case was performed without delay or accident, and the ends of the tube placed on the piers which had been built up to receive them. The truss was then lifted by hydraulic presses, the piers being built up underneath. The total cost of the whole work was £225,000. It was commenced in the beginning of 1853, and was opened on May 3rd, 1859, by H. R. H. the late Prince Consort, Warden of the Stanneries, by whose gracious permission it was called the Royal Albert Bridge.

These models were made for the late Mr. Brunel by Mr. Salter, of Hammersmith, and are both to the scale of ten feet to one inch.

[2240]

BOWER, GEORGE, *St. Neots, Huntingdonshire*.—Patented vertical gas apparatus and combined purifier, for private use, and for exportation. (*See pages 2, 3, 4.*)

[2241]

BROOKE, EDWARD, *Field House Fire Clay Works, Huddersfield*.—Glazed sewer tubes, fire-bricks, furnaces, retorts, glass pots, &c.

[2242]

BROWN, JOHN, *Chapel Field, Norwich*.—Models of patent for rendering windows, &c., wind and water-tight.

Windows and doors are by this patent rendered impervious to draft, dust, and other annoyances, without interfering with perfect ventilation. These results are essential to health and comfort.

show-cases, jewellery, silver and plated goods; cutlery, books, lace, and other articles liable to injury from the effects of gas, dust, or damp, are completely protected.

The agent of John Brown is T. Burton, 35, Wellington Street, Strand, W.C.

By this invention, when fitted to shop windows and

[2243]

BROWN, R., *Surbiton, Surrey*.—Italian and other roofing tiles; ornamental bricks, red, green, black, and white; ornamental ridge, &c.

[2244]

BROWN-WESTHEAD, MARCUS, *Manchester*.—Patent hoist governor, and patent safety railway platform lift. (*See page 5.*)

[2245]

BRUNEL, ISAMBARD, *Duke Street, Westminster*.—Models of Saltash and Chepstow bridges, designed by the late Mr. Brunel. (*See page 6.*)

[2246]

BUNNETT & Co., *Deptford, Kent*.—Patent revolving iron shutters, and ornamental brass sashes, &c.

[2247]

BURGESS, THOS. H., *4 Upper Marsh, Lambeth*.—A stand, which will admit of boots being made without sitting.

[2248]

BURT & POTTS, *38 & 65 York Street, Westminster*.—Patent water-tight wrought iron window and frame.

[2249]

CARTWRIGHT, J. M., & Co., *Swadlincote, Burton-on-Trent*.—Fire-bricks and arches for locomotive engines.

[2250]

CHALMERS, JAMES, *London (late of Montreal, Canada)*.—Drawings of proposed channel railway, connecting England and France.

[2251]

CHAPMAN, J. W., *Park Road, Richmond, Surrey*.—Plans of estates, &c.

[2252]

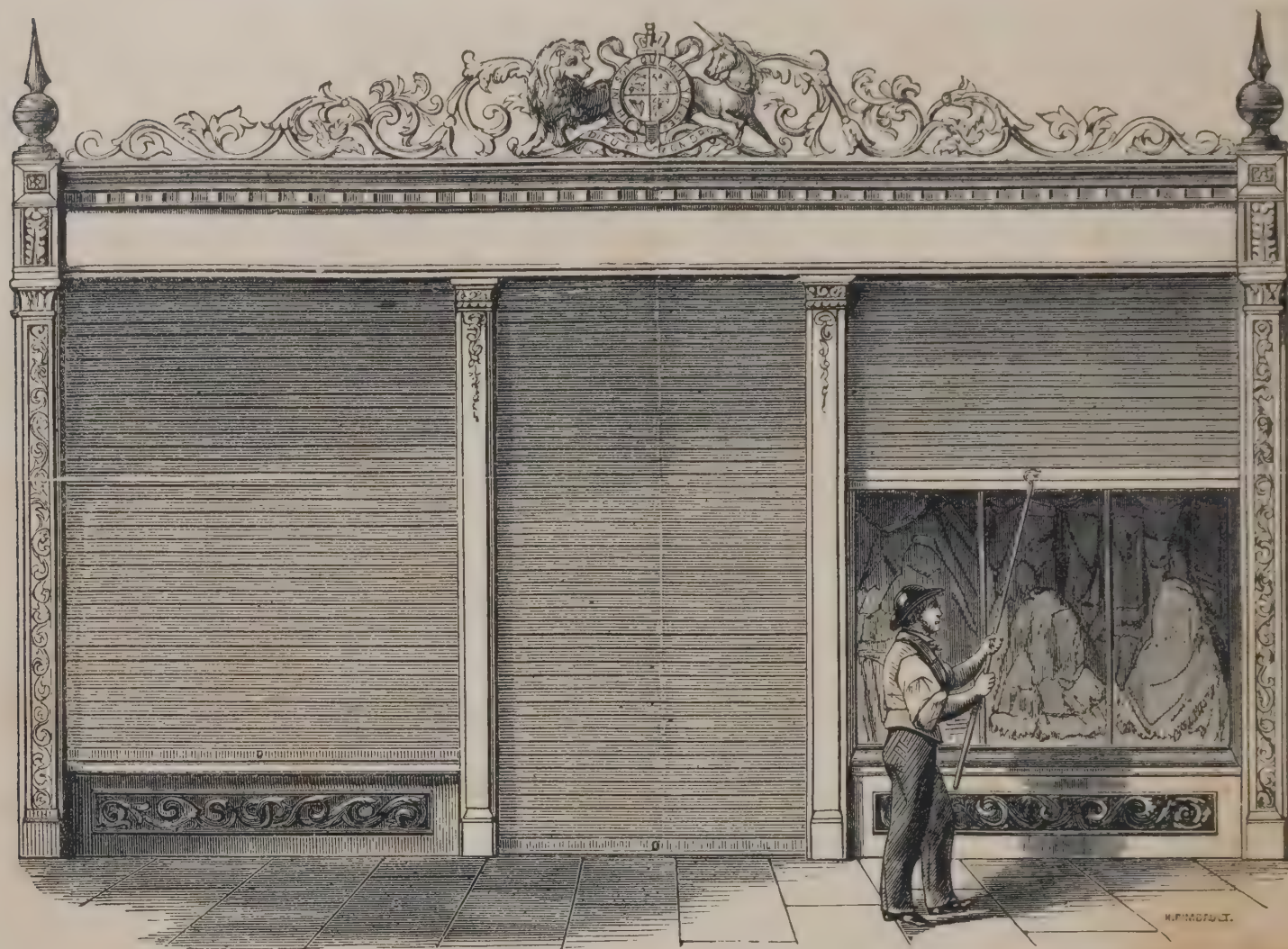
CHAPPUIS, P. E., *69 Fleet Street, London*.—Patent reflectors for diffusing daylight in dark places, and reflecting artificial light.

[2253]

CHRISTMAS, R., & JONES, *28 Lord Street, Birkenhead*.—Castellated circular turret, random rubbed; white quartz.

[2254]

CLARK & Co., *Gate Street, Lincoln's Inn Fields.*—Patentees and manufacturers of revolving shutters in steel, iron, and wood, for shop fronts, private houses, fireplaces, &c.



REVOLVING SHUTTERS FOR SHOP FRONTS.

Clark and Co.'s patent self-coiling revolving safety shutters, in steel, iron, and wood, are adapted to close, with security and ease, every description of opening,

as exhibited in shop front, Class X. The steel shutter is both thief and fire-proof, and as cheap as the ordinary wood shutters.



STEEL SHUTTER FITTED TO FIRE-PLACE.



WOOD SHUTTER ADAPTED TO BAY WINDOW.

[2255]

CLARK, EDWIN, *Great George Street, Westminster.*—Model of Clark's patent hydraulic graving docks, Victoria Docks.



MODEL OF HYDRAULIC LIFT, GRAVING DOCKS (CLARK'S PATENT), AS ERECTED AT THE THAMES GRAVING DOCKS, VICTORIA DOCKS.

This model represents a plan for docking vessels, patented by Mr. Edwin Clark, and carried out on a large scale at the works of the Thames Graving Dock Company, where it may be seen in daily use.

The system is entirely novel, and differs from an ordinary graving dock in that, instead of the vessel being floated into a pit, and the water pumped out or allowed to run out with the tide, the vessel is raised bodily out of the water, cradled upon a shallow pontoon, on which it is afterwards floated away to any place convenient for its repair. The apparatus for these enormous lifts consists of a series of hydraulic presses contained in and supported by cast-iron columns sunk into the ground in two parallel rows, the space between being sufficient for the vessel to pass through.

From the cross-head of each ram the ends of a pair of girders are suspended; these girders pass across the dock, and form a platform, on which the vessel and pontoon are lifted.

The pumping power is a small steam engine placed near the presses, the communication between it and the presses being through wrought-iron pipes. The engine does not pump direct into the hydraulic cylinders, but into an intermediate valve-chest, by which the raising power is regulated, and the uniform rise of the whole ship and pontoon secured.

The pontoons are large, shallow vessels, constructed of wrought-iron framing and shell, and are divided into several water-tight compartments, in each of which is a valve; they are made of various sizes, corresponding with the weight of the vessels they are intended to

carry. The seven pontoons now in use vary from 160 to 320 feet in length, draw from 3 feet to 6½ feet when loaded, and carry vessels of from 500 to 3,000 tons.

The hydraulic rams will safely raise a dead weight of 6,000 tons, but can be adapted to lift any weight.

The peculiarities of this system are the raising the vessel to the level of the workshops and repairing-yards, and keeping it high and dry there in full light, exposed to the drying influences of the air; while, from the vessel being carried above the pontoon, its bottom is more accessible.

The blocking or shoring the vessel, under this system, is most effectually and rapidly performed, the operation being simply the drawing in of blocks fitted to the side of the vessel, which blocks are carried on the wrought-iron transverse girders. The pontoon, being highly elastic longitudinally, accommodates its shape to the keel of the ship, whatever be its form; thus insuring a perfect bearing throughout.

Each pontoon in itself forms a complete graving dock, and one hydraulic lift is sufficient for a great number of pontoons. The cost of a graving dock complete is, therefore, little more than the cost of the pontoon, which, for all ordinary vessels, varies from £600 to £10,000; and the rapidity of an operation is so great, that at least six vessels can be docked and set afloat in an ordinary working day.

The Thames Graving Dock Company, during the three years of their practical working, have most successfully docked upwards of 400 vessels, weighing 220,000 tons.

[2256]

CLARKE, GEORGE, *Manufactory, South Crescent Mews, Burton Crescent, London.*—Clarke's improved fire escape, in use by the Royal Society for the Preservation of Life from Fire.

The great utility and importance of this machine consists in its extreme cheapness, combined with simplicity of construction, any person being able to work it after a few hours' practice. Its use has now become so apparent that no city, town, or village, and even large manufacturing premises, should be without one.

The main ladder of the escape reaches a height of 33 feet, and can instantly be applied to a second-floor window. Under the escape is a canvas trough, protected from flaming by a copper gauze.

The upper ladder folds over, and can easily be raised by levers to the position represented; and by adding an additional ladder, which is the work of a few minutes, will reach the height of 70 feet.

In cases where gardens are in the front of the houses, and the gates are



IMPROVED FIRE ESCAPE.

not of sufficient width to admit the escape, the upper ladders unship by means of shifting levers, and can be used separately.

PRICES:—

Fire escape reaching 42 feet	£45
Ditto, reaching 50 feet	50
Ditto, reaching 60 feet, with copper gauze and shifting levers, with all late improvements	63
Ditto, reaching 70 feet	£73 10s.
Ditto, above 70 feet	£105

From the Report of the Royal Society for the years 1860 and 1861, it appears that their fire escapes, manufactured solely by Clarke, were used successfully at no less than 103 fires, and 155 human beings were rescued from the flames.

[2257]

CLARKE, JOHN VIZETELLY, 251 *High Holborn, W.C.*—Gas regulators and apparatus.

[2258]

CLERK, FRANCIS NORTH, *Mitre Works, Wolverhampton, Staffordshire.*—Metal roofing and galvanized fittings for roofs and buildings.

[2259]

CLIFF, JOSEPH, & SON, *Wortley, near Leeds.*—Clay retorts, fire-bricks, sanitary pipes, chimney-tops, terra-cotta ornaments, &c. (See page 12.)

[2260]

COLLA, J. G., 18 *Parliament Street.*—Ornamental tiles, &c.

[2261]

COOKEY, E., & SON, *Frome Selwood.*—Valves for regulating the flow of gas in gas manufactories.

[2262]

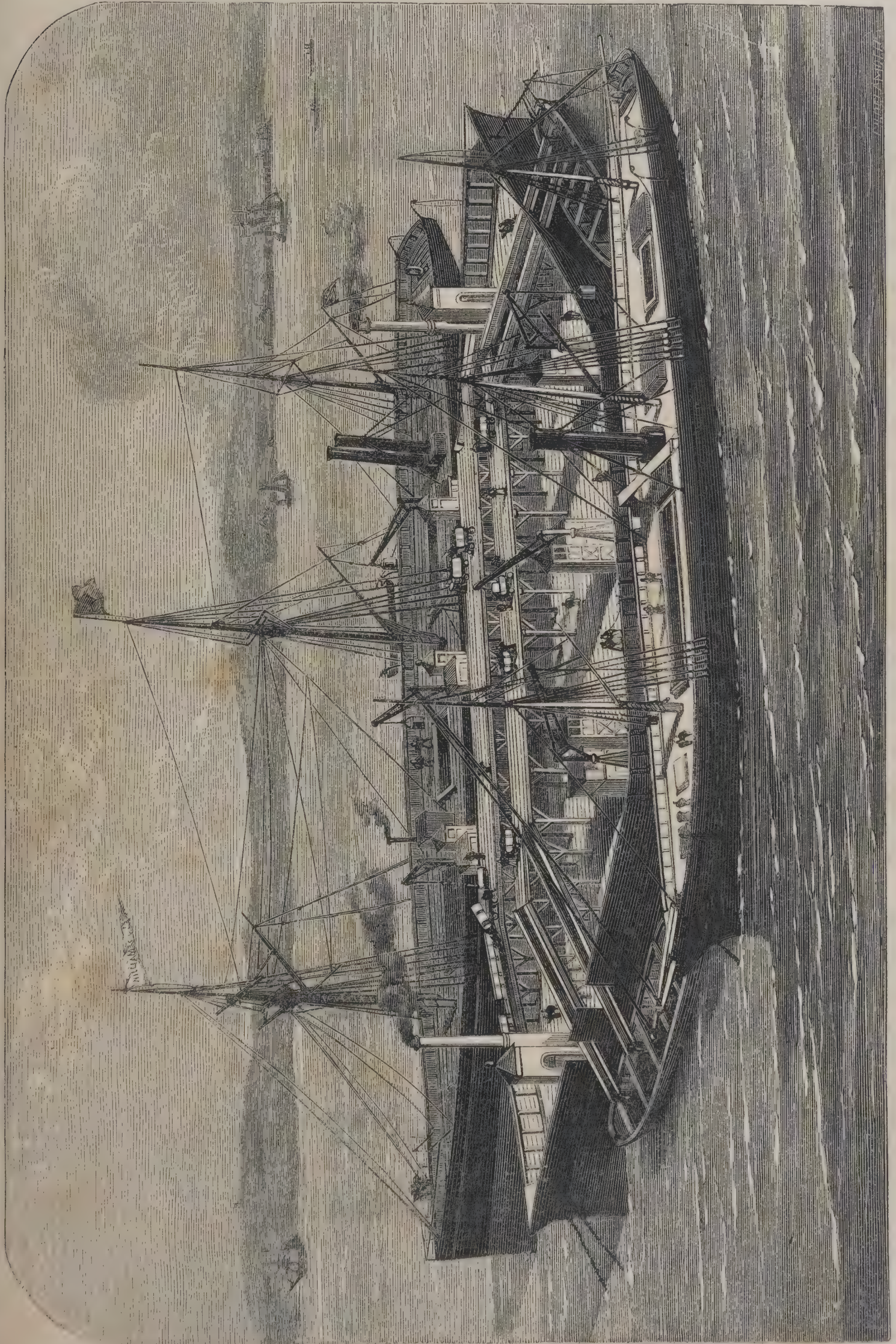
CORY, WILLIAM & SON, *Commercial Road, S.*, Owners.—J. H. Adams, 1 *Grove Hall Terrace, Bow, E.*, Engineer.—A float, with machinery for discharging screw colliers and other vessels with great rapidity, in the stream.

This vessel is fitted with Sir William Armstrong's hydraulic cranes, and is provided with other machinery and apparatus for screening the coals when required, and depositing them in barges without breakage. Two steam colliers of the largest dimensions may be discharged at once. By a suitable arrangement of the hatchways and holds of the steamers, three cranes may be worked on each steamer at the same time, and each crane can

discharge 60 tons of coals per hour. The owners are prepared to undertake to discharge steamers not exceeding 1,200 tons cargo, in ten hours, night or day. They have similar machinery on fixed buildings in operation at the Victoria Docks.

Builders and owners of steamers can obtain from Mr. Adams the requisite particulars for the adaptation of their vessels.

CORY, WILLIAM, & SON—*continued.*



A FLOAT, WITH MACHINERY FOR DISCHARGING SCREW COLLIERIES AND OTHER VESSELS WITH GREAT RAPIDITY, IN THE STREAM.

CLIFF, JOSEPH, & SON, *Wortley, near Leeds.*—Clay retorts, fire-bricks, sanitary pipes, chimney tops, terra cotta ornaments, &c.

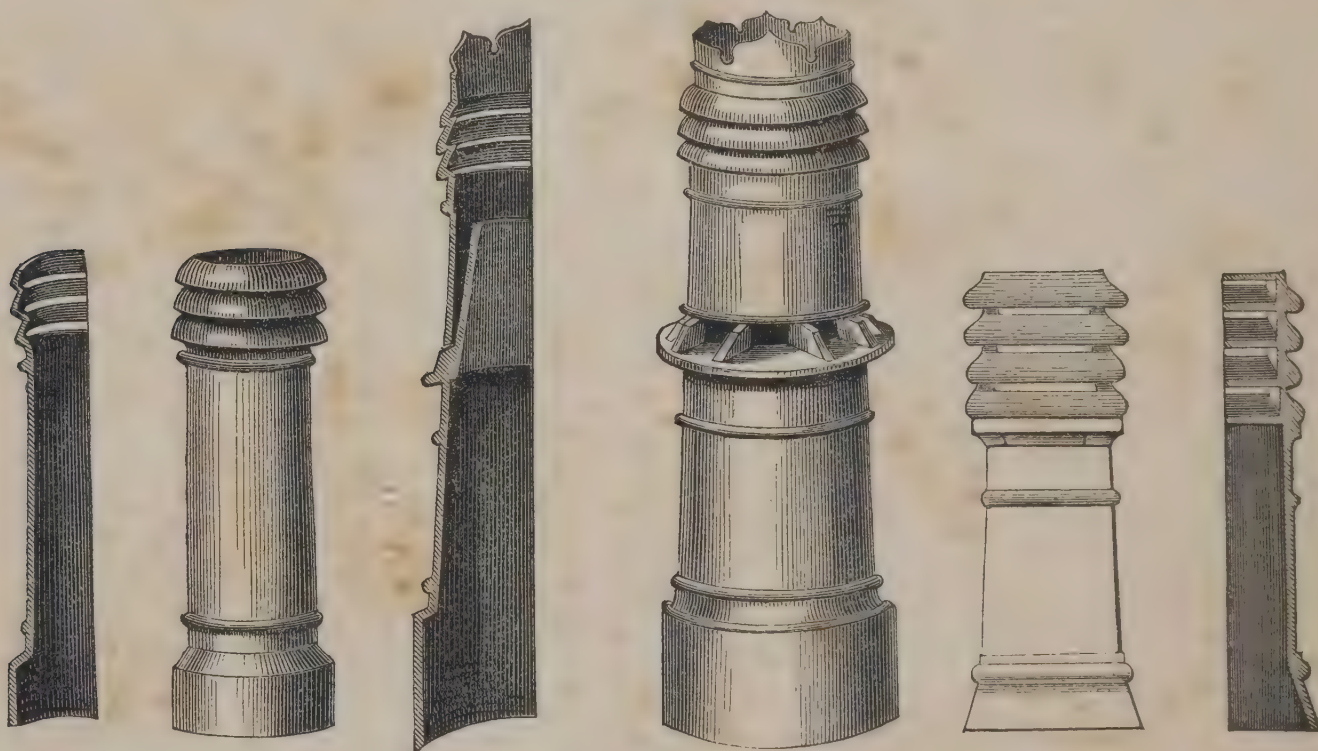


Cliff's patent enamelled clay retort is especially adapted for the use of gas works, by its smooth interior, and freedom from fire-cracks, by which the adhesion of carbon is prevented.

Its excellence is attested by the experience of the leading gas engineers of the day.

Cliff's Wortley fire-bricks are the most durable bricks manufactured for forge purposes, and the linings of blast-furnaces and glass-works.

The following designs in terra cotta chimney tops have proved themselves the most efficient wind guards introduced.



TERRA COTTA CHIMNEYS.

JOSEPH CLIFF and SON are the largest manufacturers of the patent salt-glazed socketed drain pipes in the kingdom. These pipes are made, in circular, up to 54 inches diameter, and in egg-shape, to 36×24,

for sewer and water culverts. They can be shipped in any quantity, and in all sizes, from 2-inch to 36-inch diameter, at the ports of London, Liverpool, or Hull.



London depot, No. 4 Wharf, inside Great Northern Goods Station, King's Cross, N. M. B. Newton, agent,

who will have pleasure in attending to any correspondence or appointment during visitors' stay in London.

[2263]

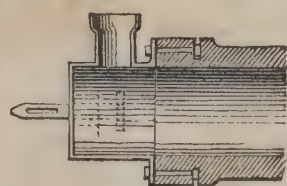
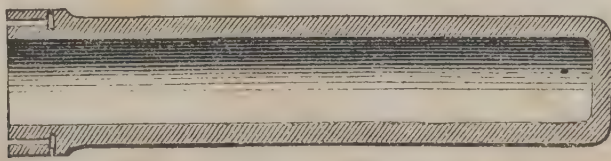
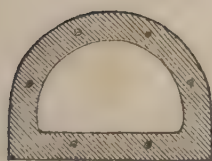
COSSER, FREDK. C., 145 *York Road, Lambeth*.—Models of railway carriage signal, and steam engine; improved chimney-pot and ventilator, for curing smoky chimneys.

[2264]

COUNCIL OF ARCHITECTURAL MUSEUM, *South Kensington, W.*—Specimens for which prizes have been awarded to artist-workmen.

[2265]

COWEN, JOS., & CO., *Blaydon Burn, Newcastle-on-Tyne*.—Patent fire-clay gas retorts, fire-bricks, tiles, &c.



Obtained the Prize Medal at the Exhibition of 1851.

Joseph Cowen and Co. are manufacturers of patent fire-clay gas retorts, fire-bricks, tiles, bearers, and all descriptions of fire-clay goods used in gas-works, blast furnaces, potteries, chemical works, &c. The Prize Medal obtained by them was the only one awarded at the Great Exhibition for fire-clay goods. They have at all times a large stock of the ordinary size of fire-bricks and tiles, and can ship them in any quantity at

a day's notice. Patent fire-clay retorts are made by this firm of any size or shape, and to fit existing mouthpieces. These retorts are well adapted for small gas-works, as they can be used without an exhaustor. Drawings of retort settings may be obtained by application.

Mead and Bell, 13, Cliff-street, New York, are Jos. Cowen and Co.'s agents for America.

[2266]

CRESSWELL, JOHN, 100 *Islington, Birmingham*.—Patent self-folding shutters.

Cresswell's Patent Shutters are (at present) unequalled for strength, neatness, and convenience.

They require no latches, bars, bolts, or other fastenings, but when closed are perfectly secure, and cannot by any accident be left unfastened.

It will be seen upon the first inspection that, from the simplicity of the construction, there being no springs, gearing, pulleys, or complicated apparatus, the chances of getting out of order are the most remote; certainly less than those of any other shutters now in use. When constructed in iron, they are perfectly fire-proof.

For bay windows they are particularly suitable; the hitherto almost *insurmountable* difficulties attending the inclosing of a bay window with shutters are entirely removed. The patentee observes, that "his shutters are

the only ones without objectionable features for the bay window."

The adoption of these shutters for bed-room windows, particularly in the country, where security is required, is suggested, as they may be fixed at small cost, and without interfering with the existent window dressings. They are especially adapted for show-glasses, book, museum, or other cases, where safety and protection from dust are essential.

J. Cresswell solicits inspection of his models and of work already executed, and will be happy to give any further information that may be required, and furnish estimates, &c. Any orders he may receive will have his best personal attention. He is prepared to furnish the trade with the sheets ready for fixing, and to grant licences to parties desiring to manufacture their own.

[2267]

DODMAN, GEORGE, 4 *Back South Parade, Manchester*.—Patent hoist safe, on eccentric principles.

[2268]

DOULTON, HENRY, & Co., *Lambeth*.—Stoneware pipes, and other articles, for sanitary and building purposes.

[2269]

DOWNING, GEORGE FRAS., 122 *King's Road, Chelsea, S. W.*—Floor-cloth.

The following are exhibited :—

- | | |
|---|---|
| 1. Model of double straining frame for floor-cloth. | 4. Stand for ditto. |
| 2. Section of built floor-cloth roller. | 5. Various trucks for moving floor-cloths. |
| 3. Ratchet handle for ditto. | 6. Hanging iron and hook for floor-cloth battens, &c. |

[2270]

DUNCAN, ROBT., 174 *Trongate, Glasgow, and at Bowling*.—Self-acting time and tide-gauge.

[2271]

EASTWOOD, JOHN & WM., *Belvidere Road, Lambeth*.—Bricks, tiles, and other manufactures, plain and ornamental.

[2272]

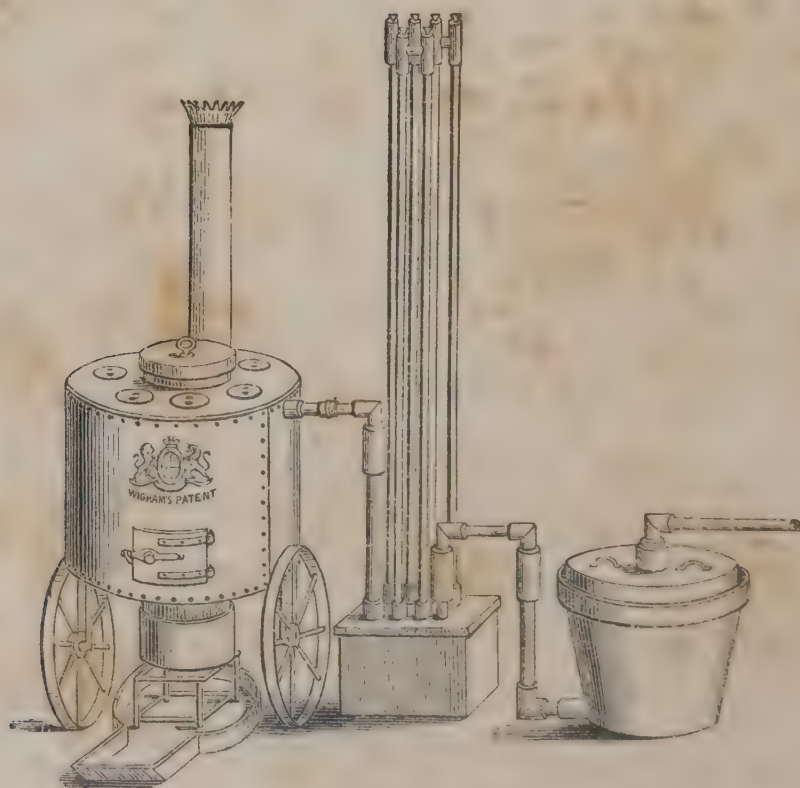
EDINGTON, THOMAS, & SONS, *Phoenix Iron Works, Glasgow*.—Cast-iron pipes.

[2273]

EDMUNDSON, J., & Co., *Dublin*.—Wigham's patent portable gas apparatus for private residences, which is suited also for cooking.

By means of this apparatus, noblemen's or gentlemen's mansions, mills, manufactories, farm buildings, railway stations, &c., even in the most remote districts, can be supplied with brilliant light, at an expense much less than from oil or candles. Any servant can manage the

apparatus with ease, and it can be removed from one residence to another, if found requisite. All information as to price, &c., can be procured by application to the sole agents for the patentee, J. Edmundson & Co., Gas Engineers, 34, 35, 36, *Capel Street, Dublin*.



WIGHAM'S PORTABLE GAS APPARATUS.

[2274]

EDWARDS, GEORGE HENRY, 90 *Aldersgate Street, E.C.*—Patent fastening for sash-lines, instantaneously connected and disconnected.

[2275]

EFFERTZ, PETER, 40 *Brown Street, Manchester.*—A diving bell.

[2276]

ELKIN, W. H., 27 *Belvedere Road, London, S.*—An improved window, which can be cleaned or repaired without danger.

This improvement, which admits of the sashes being turned inside out with the greatest ease and safety, also provides for replacing broken sash-lines, without taking down the beads, effecting a saving thereby of more than double its cost. Fittings, according to size and character

of window, at from 2s. to 6s. per set, may be obtained from the patentee.

Old windows can be altered to the above principle at a small cost.

[2277]

ERRINGTON, J. E., *V.P. Institution C.E., 13 Duke Street, Westminster.*—Viaduct across the valley of the Lune.

[2278]

FAIRFAX, BRYSON, & Co., *Birmingham, Liverpool, and London.*—Model of Maillefert's aerostatic tubular diving-bell.

[2279]

FAYLE & Co., 31 *George Street, Hanover Square.*—Architectural building blocks, facing and fire-bricks, &c.

[2280]

FIELD, W., 13 *Parliament Street.*—Pulpit for Westminster Abbey.

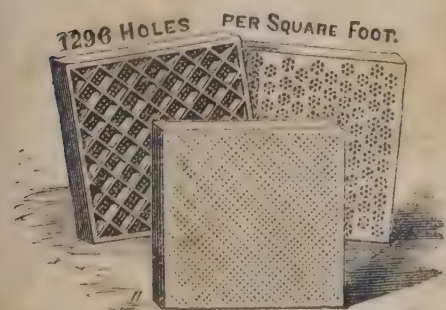
[2281]

FISHER BROTHERS & Co., *the Hayes Fire Clay Works, Stourbridge.*—Fire-bricks, gas retorts, and glass-house pots.

FISHER BROTHERS & Co. are manufacturers of fire-bricks, gas retorts, and glass-house pots; and proprietors of best glass-house pot and crucible clay.

[2282]

FISON, C. O., *Stowmarket, Suffolk.*—Kiln-tiles for drying malt, &c. (used by Messrs. Bass & Co.) ; white bricks, pantiles.



Improved Kiln Tiles. The excellence of these tiles will be certified by maltsters throughout England, who prefer them to a metal drying floor.

Their advantages are:—1st. No stoppage of the holes,

as in ordinary tiles. 2nd. The greatest possible draught. 3rd. They are made of a very fine and durable earth. Price 9d. and 10d. each.

Drying tiles for wool, cotton, &c.,

12-inch 6d. & 9d. each.

Perforated tiles for paper-makers,

12-inch 9d. & 10d. „

Best White Suffolk Bricks.

Red and White Pantiles, new waterproof pattern; requiring no mortar. The white are invaluable, where a cool roof in summer is important.

[2283]

FITZ-MAURICE, HON. MAJOR, *Conway Lodge, Hyde Park Gate.*—Patent apparatus for making oil and coal gas.

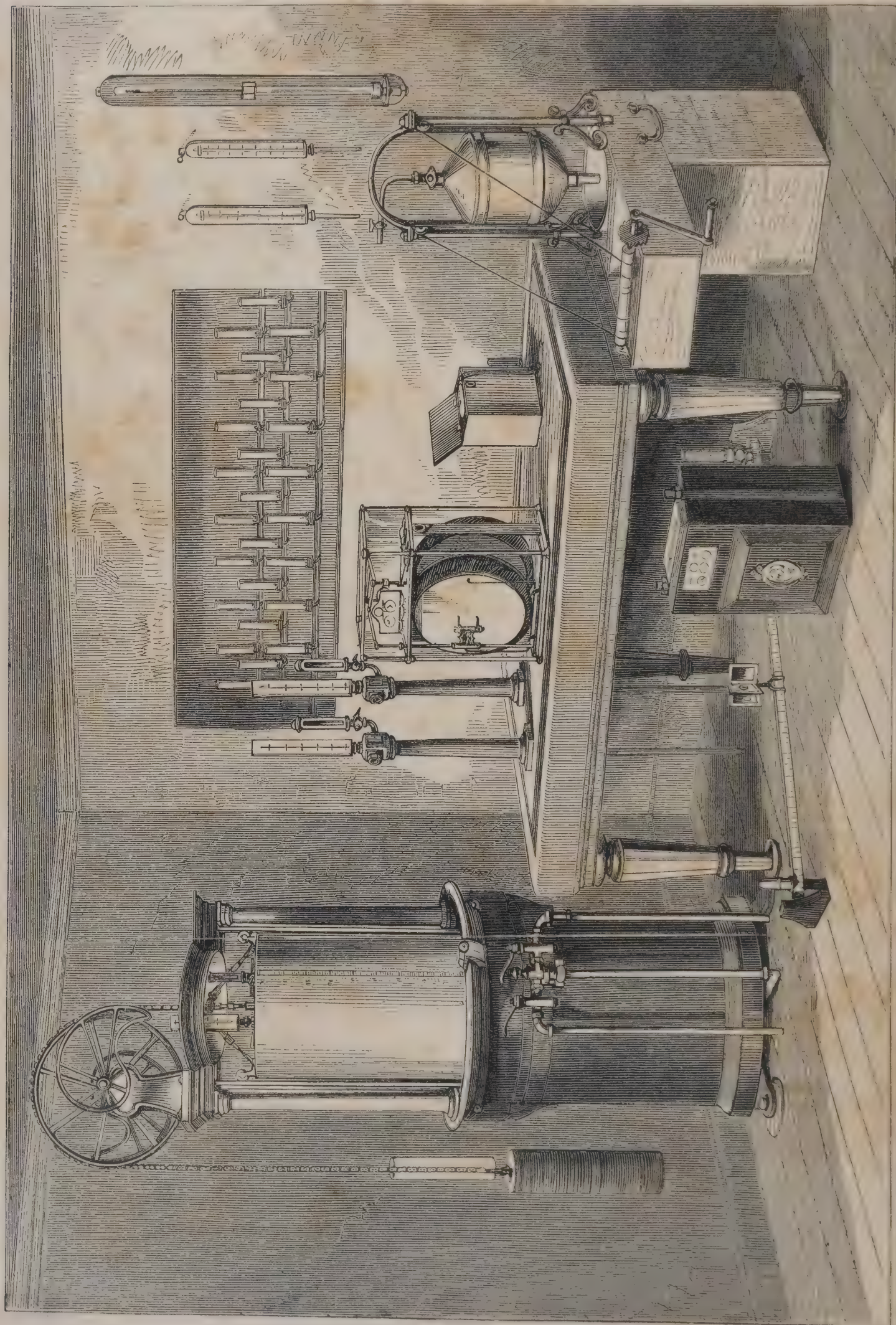
[2284]

FRANK, JOHN CHRISTIAN, E.B.A., 1 *Quadrant Grove, Haverstock Hill.*—Standing white colour; improvement in oils; improvement in metallurgy.

[2285]

FREEN & Co.—Specimens of cement.

GLOVER, GEORGE, & CO., *Ranelagh Works, Ranelagh Road, Pimlico, London; Offices, 22, Parliament Street, Westminster, and 15, Market Street, Manchester.*—Standard gasometers, similar to those deposited at the Exchequer.



GLOVER, GEORGE & Co.—*continued.*

CONTENTS OF DIAGRAM.

I. MESSRS. GEORGE GLOVER & Co.'s FIVE-FEET GAS-HOLDER; being a copy of the five-foot gas-holder belonging to the set of national standards constructed from Mr. George Glover's designs, and under his superintendence, with proper balances, indices, and apparatus, as the "Sales of Gas Act" requires.

Under this Act it was found impossible to adopt, as a standard measure, any of the gas-holders hitherto in use. The material of which they are made is very liable to corrosion when in contact with gas and water. To retard corrosion, paint is used. The paint in the inner surface of the bell diminishes its measuring capacity, and its renewal from time to time aggravates the evil. The coating of paint softens, swells, frequently rises in blisters, falls off in flakes, or crumbles away. In its ascent from the cistern the painted surface of the bell brings with it a quantity of water, which adheres to it in the form of a film, and numerous drops which adhere especially to the inner surface of the flat cover. These occasion further diminution of capacity, whilst the evaporation of the water on the outer surface of the bell lowers the temperature, diminishes the volume of gas contained, and causes error in the testing of meters.

Their measuring part is not a truly cylindrical vessel. They not only differ from each other to the extent of 3 or 4 per cent. in their measuring capacity, but the various divisions into feet, and the subdivisions of the feet, differ in the same gas-holder.

Their scales are not engraved upon the bell, and they can easily be tampered with. These circumstances precluded their adoption as standard measures for gas.

The essential properties of the national standards deposited at the Exchequer, and the derived standards for London, Edinburgh, and Dublin, which have also been constructed from Mr. George Glover's designs, are these:—

1. The metal of which they are made is an anti-corrosive alloy, which resists the chemical action of the constituents of coal-gas and water.

2. The surface of the bell readily parts with water.

3. The bell, or the measuring part of the instrument, is a truly cylindrical vessel, and sufficiently rigid to resist change of form from the application of any ordinary forces.

4. It has a correct scale engraved upon it, to indicate its capacity in cubic feet, and the subdivisions of the cubic feet into minute fractional parts.

5. It is correctly balanced, and a part of the counterpoise suspended by a cord, passing over a spiral, preserves its equipoise at varying depths of its immersion in the water in the cistern.

6. The sides of the bell are maintained vertical in its ascent and descent.

7. The taps are lined with the anti-corrosive alloy; and the density of their rubbing-surfaces is so varied, that the friction is reduced to a minimum, and their soundness and durability is thus secured.

8. The different parts of the gas-holder are so perfectly adapted to each other, that, when put together as a whole, the instrument works easily, steadily, and correctly.

The daily use of the national standards for more than twelve months has shown them to be adapted to the purpose for which they were made, and has fully justified

the opinion expressed by the Astronomer Royal, in his Report to the Lords Commissioners of Her Majesty's Treasury, that they were capable "of being applied to the verification of gas-measures of every class and of gas-meters of every class," "entirely fitted to maintain the character of our national standards," and "as accurate as it is possible for human skill to make them."

II. MR. GEORGE GLOVER'S DIRECT TRANSFERRER.—The graduation of the gas-holders was a matter of difficulty, and involved nice scientific considerations. No method was known by which the cubic foot bottle or unit of measure could be used directly in the graduation of gas-holders, or their division into multiples and decimal parts of a cubic foot. The indirect method of applying it by what was termed a "transferrer," failed to give satisfactory results, and the simple and direct method by which the volume of air defined by the contents of the bottle was transferred into the gas-holder, being graduated, was found perfectly adapted to the purpose: this direct transferrer, invented by Mr. George Glover, is now generally used in the graduation of gas-holders for testing meters.

III. THERMOMETERS.—Thermometers are used of a peculiar construction, with elongated bulbs, by which sufficient delicacy of indication is insured. One is let into a hollow column in connection with the outlet of the standard gas-holder; and another is similarly situated in connection with the outlet of the instrument being tested. On one side of the thermometer is a scale for temperature; on the other there is a scale for corrections, arising from dilatation or contraction, occasioned by variations of temperature and moisture in the gas.

IV. THE PRESSURE GAUGES.—These have no joinings; they are made of one piece of glass tube, of large bore, and they have an enamelled scale, which is easily read.

V. TESTING TABLE.—Messrs. George Glover and Co.'s testing table is truly levelled, and so constructed as to be easily maintained in a horizontal position.

The same principles which have been successfully applied in constructing the national standard gas-holders, Messrs. G. Glover and Co. apply in the manufacture of their patent dry gas meter. See "Illustrated Catalogue," Class XXXI.

VI. THE PHOTOMETER.—Next in importance to correct standard measures for gas is the correct measurement of its illuminating power. This is determined by means of the photometer, in connection with which minute quantities of the gas under examination can be measured by Messrs. G. Glover and Co.'s patent dry gas meter, the dial of which is modified for this purpose, and the $\frac{1}{600}$ th part of a cubic foot is measured each second.

VII. THE PNEUMATOMETER.—Illustrating the extreme accuracy in the measurement of gas by means of their patent dry gas meter, by a suitable modification of the index, it is used as a pneumatometer for measuring the capacity of the chest. This enables the experimental physiologist to determine with precision the quantity of carbon discharged from the lungs at each expiration, and the minute variations which occur in the same individual at different periods of the day and different seasons of the year. It is valuable to the physician and surgeon in the diagnosis of disease, in testing recruits for the army, and applicants for life assurance.

[2286]

GARRETT BROTHERS, *Tunstall, Staffordshire; Paddington, London.*—Ridging, roofing, and flooring tiles; plain and ornamental pavements, &c.

[2287]

GIBBS, G., *Brentford.*—Iron breakwaters, &c.

[2288]

GIBBS & CANNING, *Tamworth*.—Glazed stoneware sewerage pipes, &c. ; fire-bricks, and terra cotta.

[2289]

GIBSON & TURNER, *Ball's Bridge, Dublin*.—Models of bridges.

[2290]

GILKES, WILSON, & Co., *Middlesbro'-on-Tees*.—Model of the Beelah Viaduct, Westmoreland

Model to a scale of 1 inch to a foot of a railway viaduct over the river Beelah, on the line of the South Durham and Lancashire Union Railway, Westmoreland.

This viaduct is the lightest and cheapest combination of cast and wrought iron that has ever been adopted. It is much cheaper than stone, and for rapidity of construction is unequalled. The whole structure, 1,000 feet long, and 200 feet high, was erected in four months.

[2291]

GLOVER, GEORGE, & Co., *Ranelagh Works, Pimlico*.—Standard gasometers, &c. (*See page 16.*)

[2292]

GRAY, JAMES, M.D., *Glasgow*.—Coating to preserve iron, wood, and stone.

[2293]

GREENWOOD, JOHN, 10 *Arthur Street West, London Bridge*.—Patent india-rubber stops to make air-tight joints.

[2294]

HARTLEY, T. H., *Esher Street, Westminster*.—Sculptured specimens of marble-work.

[2295]

HAWKSHAW, JOHN, and WILLIAM HENRY BARLOW, 33 *Great George Street, Westminster*.—Model of suspension bridge proposed to be erected at Clifton.

[2296]

HEINKE BROTHERS, 79 *Great Portland Street, London*.—Sub-marine helmet, dress, and diving apparatus.

Obtained First Class Medals at the Great Exhibition, 1851, and at the Paris Exhibition, 1855.



Heinke Brothers have effected improvements in this apparatus, by which the diver is enabled to remain any length of time under water. It is now an invaluable aid in the recovery of property from wrecks; in sub-aqueous engineering, and in pearl and sponge diving. This firm are submarine engineers to the English, French, Russian, Spanish, Portuguese, Sardinian, Canadian, Peruvian, Brazilian, and Indian Governments.

Extract from the Report of the International Jury on the Paris Exhibition of 1855, relative to Mr. E. Heinke's Diving Apparatus :—

“The principal improvement which he has introduced consists in enabling the diver to remain under water when an accident occurs, such as the breaking of a glass which would otherwise have allowed the water to penetrate into the dress.”—Vol. ii., page 41.

[2297]

HELPS, ARTHUR, *Vernon Hill, Bishop's Waltham*.—Clays, various; terra cotta, brick, and tileware.

[2298]

HEMMING, SAMUEL C., & Co., 21 *Moorgate Street*.—Samples of iron buildings and iron roofing.



INTERIOR OF AN IRON CHURCH.

[2299]

HOLLAND, W., *St. John's, Warwick*.—Apparatus for raising and lowering window sashes.

[2300]

HOOD & SON, SAMUEL, 68, *Upper Thames Street, and West London Iron Works, Notting Hill, London*.—Wrought-iron sashes, staircase, and baluster.

A cast-iron circular staircase, which can be made of any radius without strings or plates. | Staircase balusters, with adjusting caps, to suit various bevils. Wrought iron sashes and casements.



[2301]

HOWIE, JOHN, *Hurlford Fire Clay Works, N.B.*—Fire-bricks, troughs and mangers, chimney cans, vases, fountain, &c.

[2302]

INGHAM & SONS, WILLIAM, *Wortley, near Leeds*.—Fire-bricks, gas retorts, sanitary tubes, and terra cotta.

[2303]

JACKSON, R. W., *Greatham Hall, Durham*.—Model of West Hartlepool harbour and docks.

[2304]

JAMIESON, ROBERT, *Glasgow*.—Permeating timber, prevents dry rot; coating stone, wood, iron, &c., prevents decay.

[2305]

JENN, JOSEPH, JUN., 38 *Whittlebury Street, Euston Square*.—Jelly or cake moulds.

[2306]

JONES, WILLIAM, *Springfield Tileries, Newcastle, Staffordshire*.—Terra metallic ridging, roofing, and paving tiles, red, blue, and buff.

[2307]

KENNEDY, LIEUT.-COLONEL J. P., *Torrington Square*.—Elements essential to railway success, illustrated by Baroda works.

[2308]

KNIGHT, BEVAN, & STURGE, 155 *Fenchurch Street*, and *Belvedere Road*, *Lambeth*, and *Northfleet, Kent*.—Portland cement.

A block of solid Portland cement weighing five tons, and samples of their manufacture are shown; also two large blocks composed of nine parts of shingle to one part of cement for breakwaters, shown in the open court of the eastern annexe, weighing respectively eight, and three-and-a-half tons. This cement, from its very

superior hydraulic properties and relative cheapness to stone, is an article of great commercial importance. It is principally employed for blocks for breakwaters, harbour works, concrete work, stuccoing, plastering, bridges, cisterns, aqueducts, sewers, tanks, reservoirs, flooring, and paving, &c. &c.

[2309]

LAIDLAW & SON, *Edinburgh and Glasgow*—Gas meters and fittings.

[1310]

LAWRENCE BROTHERS, *City Iron Works, Pitfield-street, London, N.*

WORKING MODELS.

Improved Warehouse Lifts, so constructed that when used for lowering goods, only the brake is required, the cage returning to the upper floors for a fresh load by means of a balance-weight. This Lift can be worked by one man from any floor.

Warehouse Crane, with expanding jib, for loading carts in streets where the pavements are wide.

Diving Bell, with signal apparatus and safety-valve, to prevent accidents from the breaking of the air hose. This model shows the apparatus as used by Messrs. H. Lee & Son, at the Dover Pier.

Travelling Crane, the traversing motions being worked from the crab. The bevilled wheels ordinarily used are dispensed with.

Lawrence's Patent Sluice, in which the pressure of the water is made to raise the sluice. The mode of construction is shown in the engraving.

A. The paddle, the top fitting the chamber, B.

C D. Small sluices or valves, connected together by a rod, so that when C is opened, D is closed.

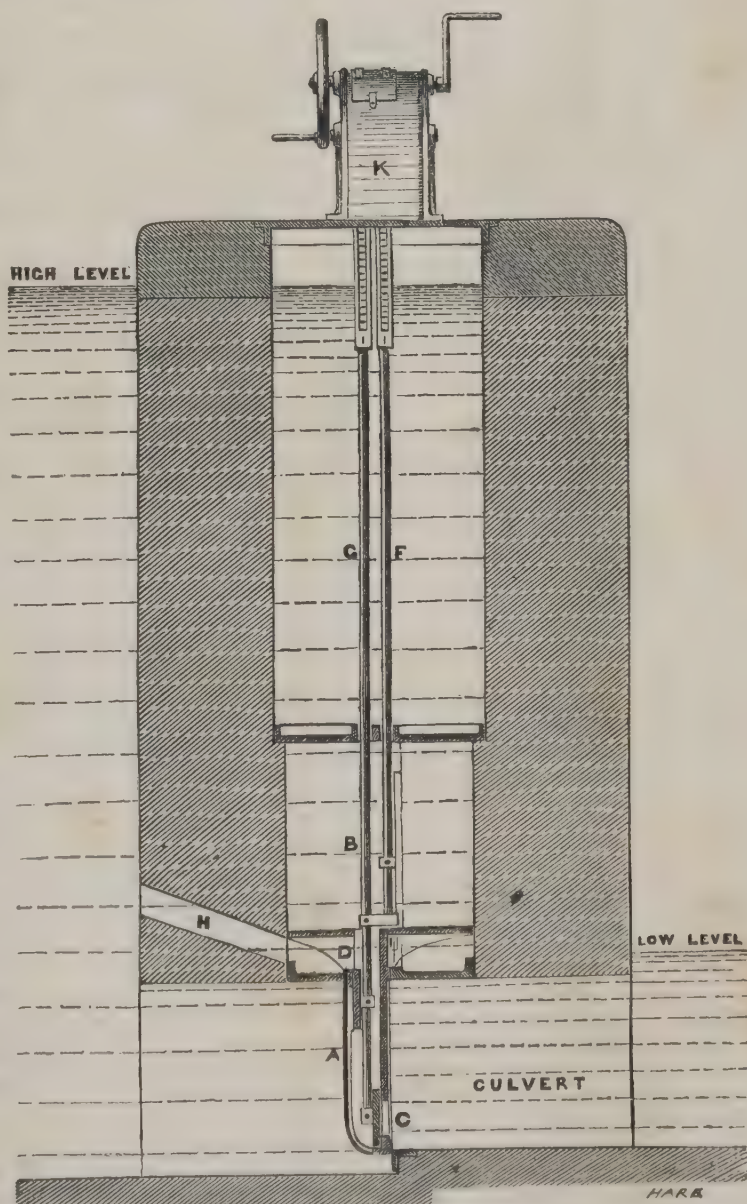
F. Rod from paddle, A, to machinery, K.

G. Rod from valves C and D to machinery, K.

H. Passage to high level. On turning the handle of machinery, K, the valve, C, is opened, and D closed; the water in the chamber, B, immediately runs off to the low level, and the high level water, passing through channel H, presses against the piston plate attached to the paddle, A, and forces the sluice up, the rising being regulated by a brake. To lower the sluice, the machinery is reversed, and the rod, G, lowered, closing C, and opening D. The chamber, B, immediately fills with the high level water, and the sluice is forced down, closing the culvert.

Six sluices of large size, constructed as the model, are now at work at the Lavender Entrance of the Commercial Docks, Rotherhithe, and at the same Docks a similar plan has been adopted for opening the sluices on the gates of the Old Entrance Lock.

Improved Hydrant, or Fire-Cock, worked by a screw. All the parts are so arranged that they are not liable to get out of order or leak, even under very high pressure. This hydrant is used by H.M. War Department at many of their establishments.



LAWRENCE'S PATENT SLUICE.

[2311]

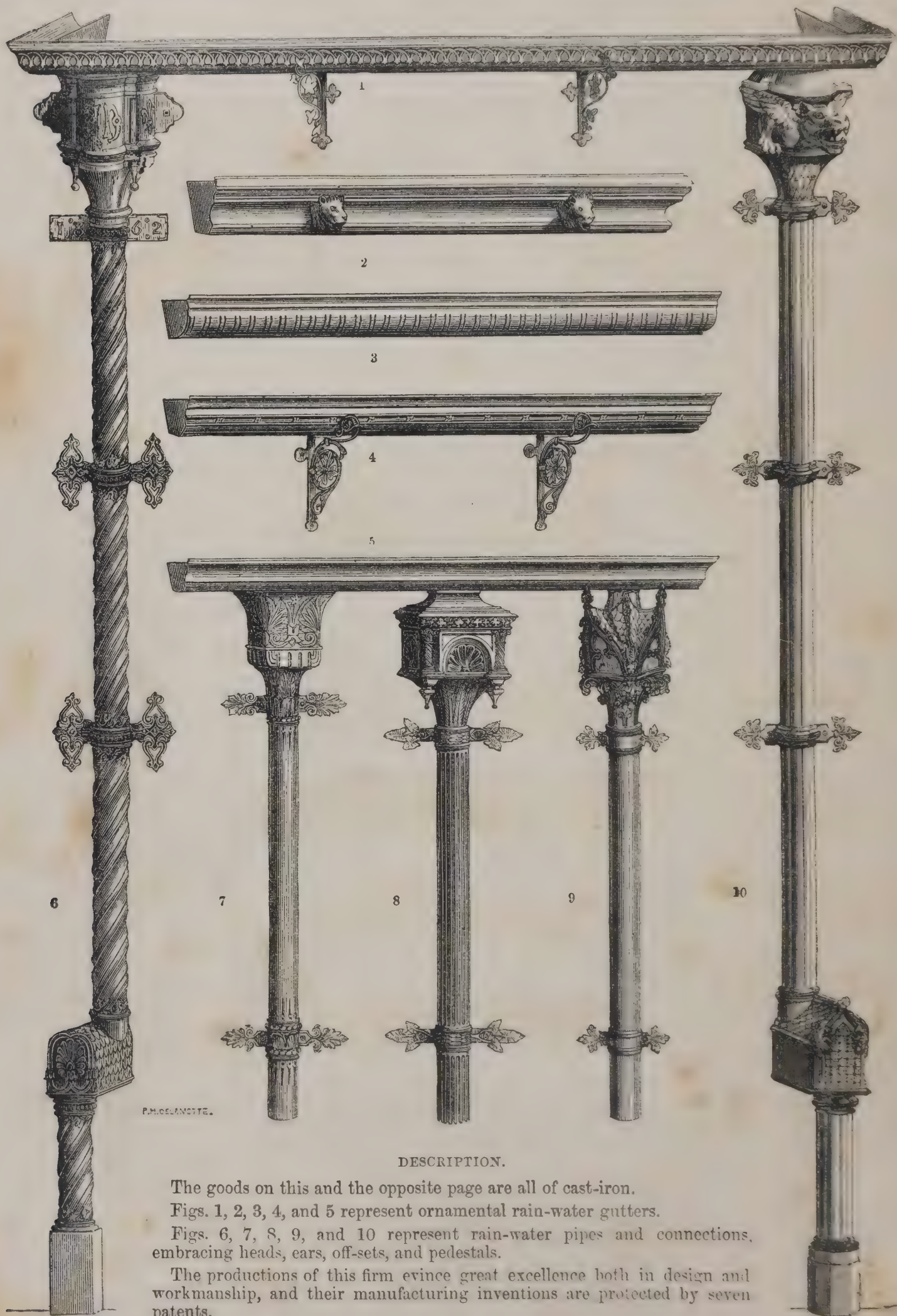
LEE, SON, & SMITH, 16 *Upper Ground Street, Blackfriars, S.*—Limestone, lime; Portland and Scott's cement; Scott's plaster.

[2312]

LUCAS, A., & SONS, *Fire-brick Works, near Gateshead-on-Tyne*.—Fire-bricks' goods.

[2313]

MACFARLANE, WALTER, & CO., *Saracen Foundry, Glasgow.*—Architectural cast-iron appliances, pipes, gutters, cresting, finials, &c.



P. H. DELANOTTE.

DESCRIPTION.

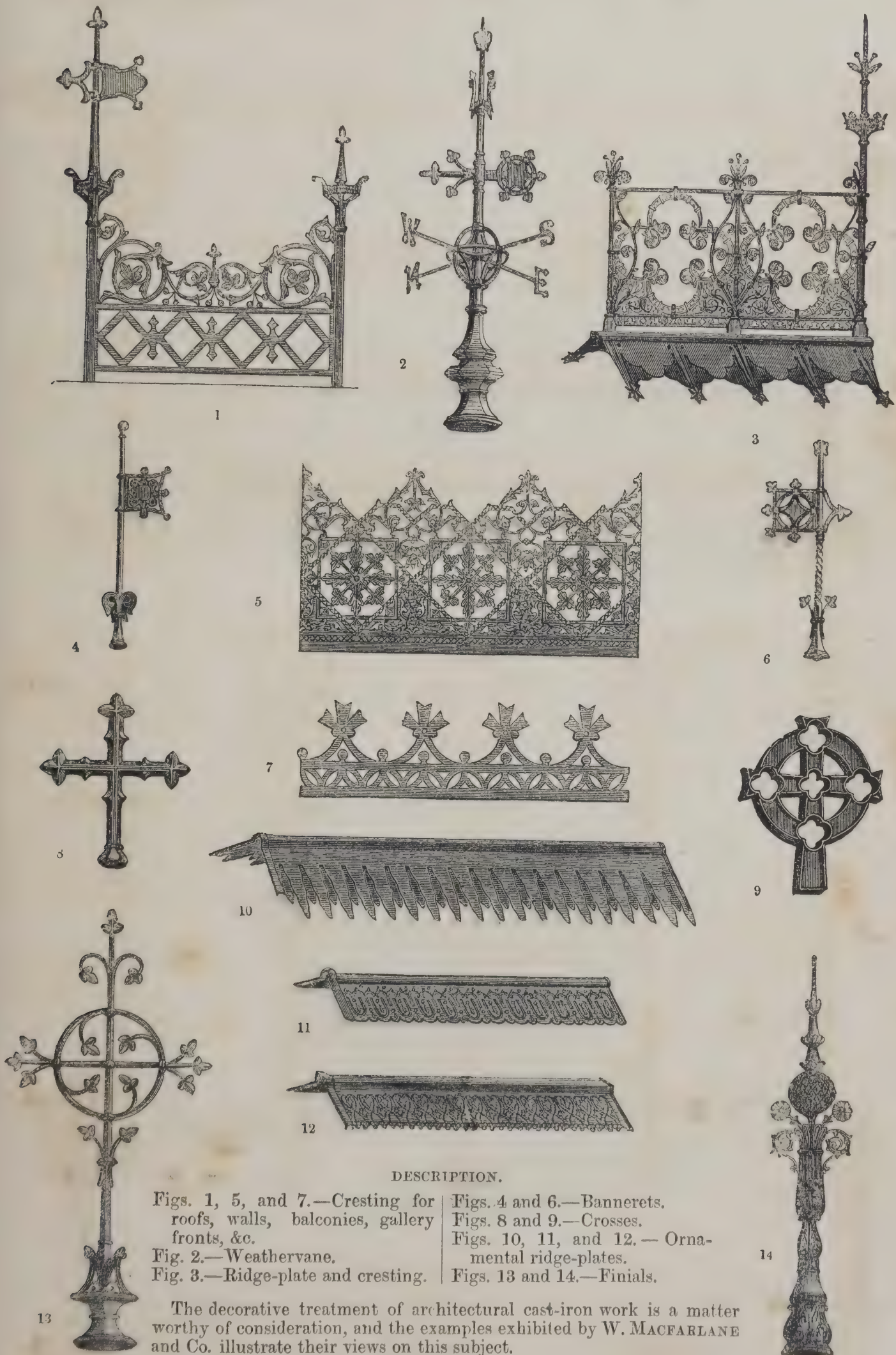
The goods on this and the opposite page are all of cast-iron.

Figs. 1, 2, 3, 4, and 5 represent ornamental rain-water gutters.

Figs. 6, 7, 8, 9, and 10 represent rain-water pipes and connections, embracing heads, ears, off-sets, and pedestals.

The productions of this firm evince great excellence both in design and workmanship, and their manufacturing inventions are protected by seven patents.

MACFARLANE, WALTER, & Co.—*continued.*



DESCRIPTION.

Figs. 1, 5, and 7.—Cresting for roofs, walls, balconies, gallery fronts, &c.
Fig. 2.—Weathervane.
Fig. 3.—Ridge-plate and cresting.

Figs. 4 and 6.—Bannerets.
Figs. 8 and 9.—Crosses.
Figs. 10, 11, and 12.—Ornamental ridge-plates.
Figs. 13 and 14.—Finials.

The decorative treatment of architectural cast-iron work is a matter worthy of consideration, and the examples exhibited by W. MACFARLANE and Co. illustrate their views on this subject.

[2314]

MACINTOSH, JOHN, 40 *North Bank, Regent's Park*.—Samples of telegraphic cables.

[2315]

MACLAREN, ROBERT, & CO., *Eglington Foundry, Glasgow, N.B.*—Four cast-iron pipes.

[2316]

MACNEILL, SIR JOHN, LL.D., F.R.S., 23 *Cockspur Street*.—Model of bridge over the Boyne.



BRIDGE OVER THE BOYNE.

Malleable Iron Lattice Bridge over the river Boyne, near the town of Drogheda, on the line of the Dublin and Belfast Junction Railway, completed in 1855.

Total length 1750 feet.

Height of under side of girders above

high water 90 „

Span of centre openings 264 feet.

Span of side openings 138 „ 8 in.

Span of stone arches 60 „

Weight of iron in lattice work about 700 tons.



[2317]

MAW, GEORGE, *Benshall Hall, Shropshire*.—Manufactures of clay, &c.

[2318]

MAW, GEORGE, *Broseley, Shropshire*.—Collective series of artificial productions, illustrating the clay manufactures of the Shropshire Coal Field. (*See pp. 26, 27.*)

[2319]

M'LINTOCK, WILLIAM, 38 *Kirk Street, Gorbals, Glasgow.*—Hydraulic (Arden) lime ; bituminous shale, containing paraffin oils.

[2320]

MEARS, GEORGE, & Co., 267 *Whitechapel Road.*—Bell 15 cwt., and self-acting apparatus for striking ditto.

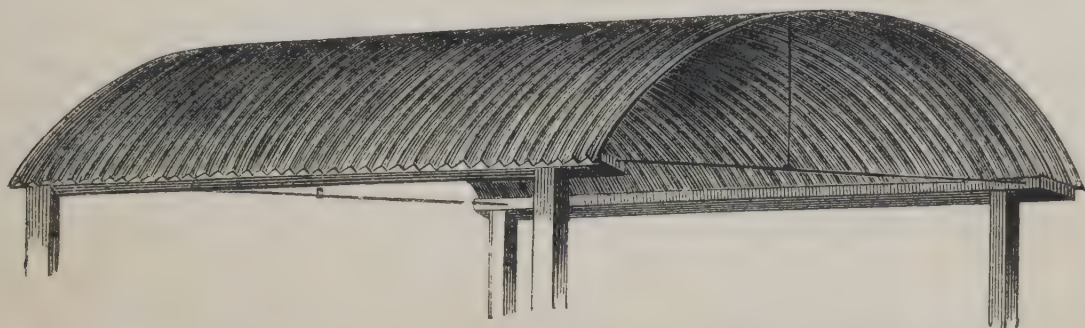
[2321]

MOREWOOD & Co., *Dowgate Dock, London, and Lion Works, Birmingham.*—Galvanized iron roofs, farm buildings, &c.

MOREWOOD & Co. manufacture patent galvanized tinned iron and galvanized iron, plain or corrugated, curved, and in tiles, of all gauges. Black or painted corrugated iron, galvanized or black-cast gutters, pipe, &c. They are also the makers of Morewood's patent con-

tinuous galvanized iron roofing, which is cheaper than felt. Full particulars may be obtained on application.

Mining sheds, engine sheds, farm sheds, and every description of galvanized farm building, are constructed by these exhibitors.



Specimens of the following are exhibited :—
Patent galvanized tinned iron and galvanized iron, plain and corrugated.

PATENT CONTINUOUS GALVANIZED IRON ROOFING.

—This roofing is cheaper than felt when mixed complete. Full particulars may be learned on application, and estimates will be supplied for roofs, churches, and every description of galvanized iron building.

[2322]

MORTON, FRANCIS, & Co., *Liverpool.*—Patented improvements in permanent railway fences ; iron telegraph poles ; galvanized corrugated iron roofs, buildings, &c. (*See pages 28 to 30.*)

[2323]

MURRAY, JOHN, 7 *Whitehall Place.*—Cellular wine bin, or *porte-bouteilles*.

[2324]

NORMAN, RICHARD & NATHAN, *Burgess Hill, Sussex.*—Specimens of ornamental bricks, tiles, &c. &c.

[2325]

PAINE, MRS., *Farnham, Surrey.*—Artificial stone ; terra cotta bricks, pipes, &c., made from soluble silica (patent).

[2326]

PART, J. C., 186 *Drury Lane.*—Martin's cement and plaster of Paris.

Obtained Prize Medal in 1851.

PART'S MARTIN'S CEMENT is the best internal cement in use, and can be painted upon within twenty-four hours of its application. A saving of 45 per cent. in the bare cost of material will be effected by using this

cement. Manufactured only by J. Cumberland Part, 186 Drury Lane, London, and at Derby.

PLASTER OF PARIS.—Coarse, fine, and superfine.

[2327]

PATENT BITUMENIZED WATER GAS AND DRAINAGE PIPE COMPANY, 14A *Cannon Street, E.C.*—Inoxidable pipes, one-fourth weight of iron pipes.

[2328]

PEAKE, THOMAS, *The Tileries, Stoke-upon-Trent, and City Road Basin, London.*—Terrometallic bricks, tiles, &c.

[2329]

PELD, B., *Birkenhead.*—Model of iron bridge.

MAW, GEORGE, *Shropshire, Broseley*.—Collective series of architectural productions, illustrating the clay manufactures of the Shropshire Coal Field, classified and arranged by GEORGE MAW, F.S.A., F.L.S., on behalf of the undermentioned exhibitors.

BURTON, MESSRS. JOHN AND EDWARD, *Ironbridge*.

COALBROOK DALE COMPANY, *Lightmoor Works, Coalbrook Dale*.

DAVIS, MESSRS. GEORGE & CO., *Broseley*.

DOUGHTY, MR., *Jackfield, near Broseley*.

EVANS, MR. ROBERT, *Jackfield, near Broseley*.

EXLEY, MR. WM., *Jackfield, near Broseley*.

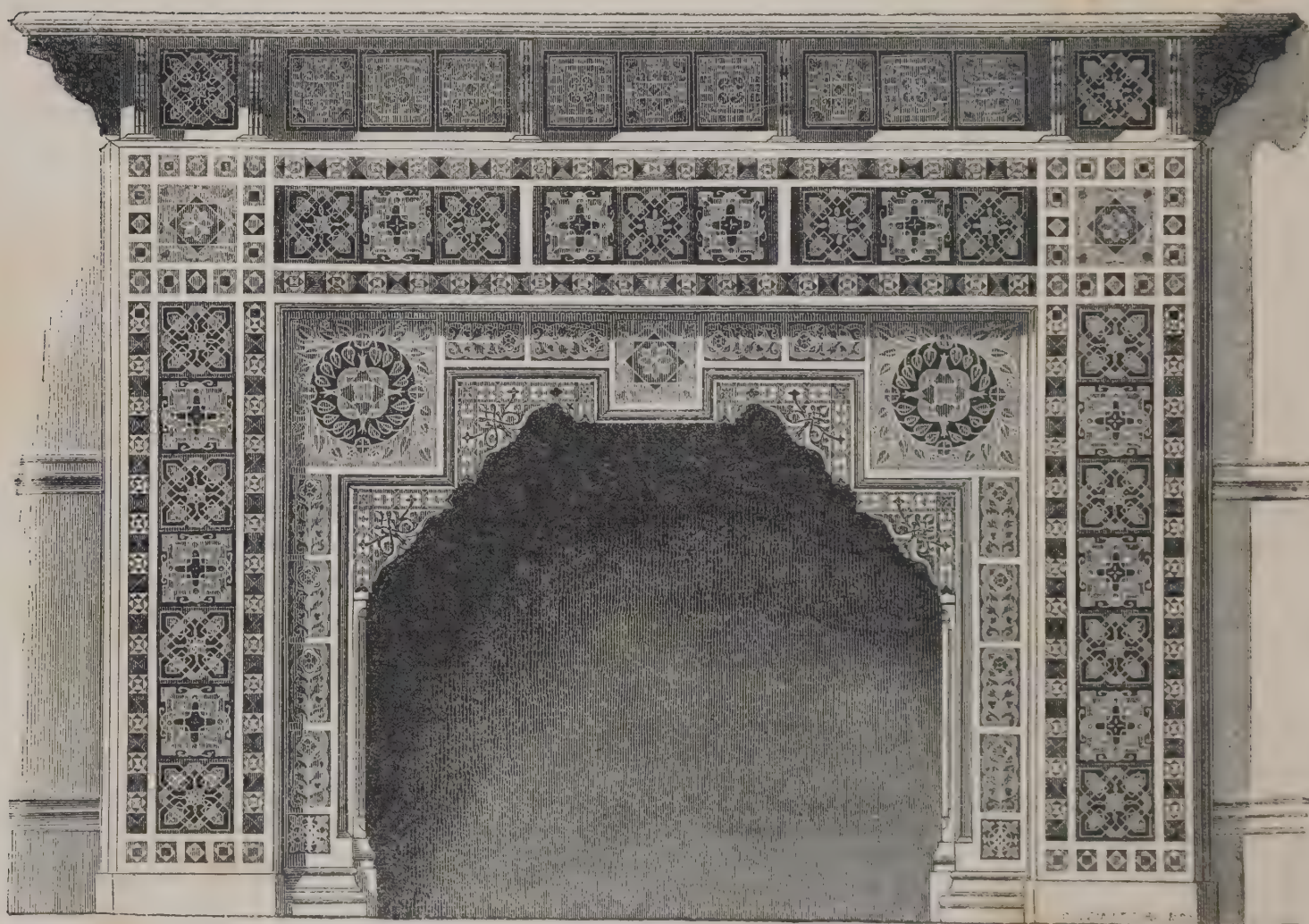
LEWIS, MR. G. W., *Jackfield, near Broseley*.

MADELEY WOOD COMPANY, *Madeley Wood Fire Brick Works*.

MAW, MESSRS., & CO., *Benthall Works, Broseley*.

SIMPSON, MESSRS., W. B., & SONS, 456 *West Strand*. *London Agents for MAW & Co.*

THORN, MRS., *Broseley*.



CHIMNEY PIECE, COMPOSED OF ENAMELLED TILES AND STONE.

Division A, roofing materials.

Common, plain, and ornamental flat roofing tiles, unglazed, glazed, and enamelled, of various patterns and colours. (Arrangements designed by Mr. Digby Wyatt.)
Pantiles.

Roof crestings, plain, flanged, and with fixed and loose ornaments, brown, black, glazed, and enamelled. Ventilating roof crest tiles.

Various hip and gutter tiles, and flanged hip crestings.

MAW, GEORGE—*continued.*

Division B, paving materials.

Illustrations of the revival of pictorial mosaic, consisting of a pictorial mosaic pavement, 13' 3" × 10' 9". Subject, "Apollo, and the Four Seasons," designed by Mr. M. Digby Wyatt, and manufactured by Maw and Co. For sale. Can be adapted to any size to suit particular dimensions.

Facsimile copy of head, from ancient Roman pavement at Bignor, in Sussex. Maw & Co.

Examples of tessellated pavements. Maw & Co.

Examples of geometrical mosaic pavements. Maw & Co.

Examples of encaustic tile pavements, and of combinations of plain and encaustic tiles. Maw & Co.

Moresque mosaics for wall linings. Maw & Co.

Various combinations of enamelled Majolica tiles, for wall, cornice, bath, and fire-place linings. Maw & Co.

Box of loose examples of various mosaics and tiles, manufactured by Maw and Co.

Examples of common square and hexagonal paving tiles, loose, and in combinations. Maw & Co.

Drawings of mosaic and encaustic tile pavements, executed by Maw & Co.

Stable paving bricks. John and Edward Burton.

Malt kiln, flue tiles, and bearers.

Division C, draining materials.

Flanged and unflanged sanitary tubes, from four to twelve inches in diameter, with bends, junctions, traps, &c.

Agricultural draining pipes and horse-shoe pipes.

Gutter bricks, of various sizes.

Flood-bolt bricks, for irrigation. Mrs. Thorn.

Eave spouting bricks and cornice, with inner and outer returns, manufactured by Mr. Exley.

Division D, fire-bricks, furnace materials, stove fittings, &c.

Common fire-bricks, of various forms, arch bricks, bull-heads, pin bricks, soap bricks, &c.

Various fire-clay blocks, used in the construction of iron furnaces.

Fire lumps, of various sizes.

Fire squares, of various sizes.

Fire-place chucks, cooking-apparatus-slabs, and oven slabs, of various forms and sizes.

Grate backs, sundry patterns. Coalbrook Dale Company.

Gas retorts, retort bricks and covers.

Arnott stove-pot linings. Coalbrook Dale Company.

Fire-clay kiln bars. Madeley Wood Company.

Cundy's hot air stove fittings. Coalbrook Dale Company.

Rebated flue bricks, key bricks, and various materials used in porcelain works. Messrs. Burton, and Madeley Wood Company.

Division E, bricks and materials used in the construction of walls.

Common, pressed, and moulded bricks and blocks for walls, arches, copings, window jambs, gables, chimneys, plinths, cornices, &c.

Boosey or manger bricks.

Various glazed and enamelled arch and other bricks. Maw & Co.

Log bricks for pit shafts.

Penneystone Mount bricks, made from the refuse of ironstone pits. Mr. Doughty.

Division F, accessories to the decoration of buildings and various articles not included in the other divisions.

Various terra cotta architectural decorations.

Various examples of enamelled terra cotta decorations, from the designs of Mr. Digby Wyatt, including pillar caps, chimney tops, round columns, arch bricks, &c. Manufactured by Maw & Co.

Examples of terra cotta balustrading. Mrs. Thorn, and Coalbrook Dale Company.

Various terra cotta chimney tops.

Flower borders, edgings, tiles, and returns.

Hot-house and vinery squares and channels.

Sundry terra cotta vases, flower pots, stands and pedestals, orchid pots, mignonette boxes, flower and orange tree boxes, &c. Designed by Mr. Kremer. Manufactured by the Coalbrook Dale Company.

Step bricks.

Chimney piece, composed of enamelled tiles and stone. Manufactured by Maw & Co. Designed by Mr. M. Digby Wyatt. The stonework executed by Mr. Richard Yates, builder, Shiffnal. For sale. *See Engraving.*

Orange tree, and mignonette boxes, the former having a space between the slate lining and tiles to keep the soil cool, composed of Majolica tiles, set in electro-bronzed framing. Manufactured by Maw & Co., from designs by Mr. M. Digby Wyatt. For sale.

Division G, raw materials.

Various specimens of clays and other materials from the Shropshire Coal Field, in the native and burnt state; also made up into squares to show their relative shrinkages.

Section of Shropshire Coal Field, showing the disposition of clay beds, and other materials used in the manufacture of the series. Mr. G. Maw.

MORTON, FRANCIS, & Co., *Liverpool*.—Patented improvements in permanent railway fences ; iron telegraph poles ; galvanized corrugated iron roofs, buildings, &c.—Manufacturers of every description of fire-resisting iron roofs and buildings for agricultural and colonial purposes ; iron roofs for docks, railways, shipbuilding yards, &c. ; cranes, weigh-bridges, wire ropes, electric telegraphs, &c.

Francis Morton & Co.'s patented improvements in the construction of permanent efficient fences for home and foreign railways, parks, pleasure-grounds, &c., have obtained the Silver Medals and highest commendations of all the principal Agricultural Societies of the United Kingdom.

Fig 10.

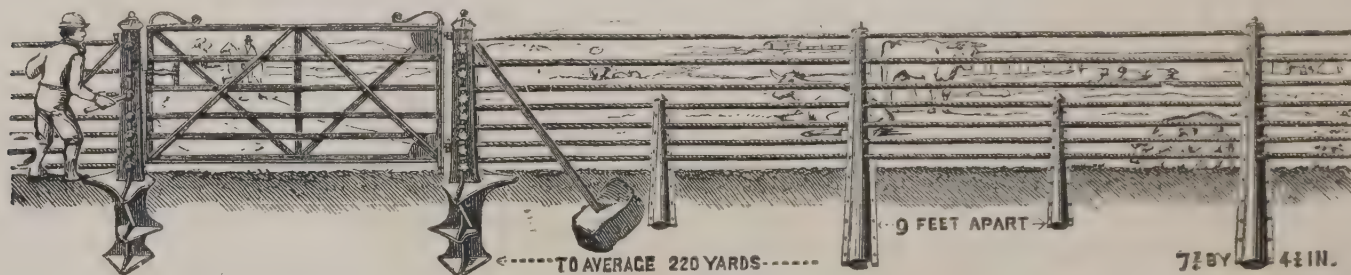
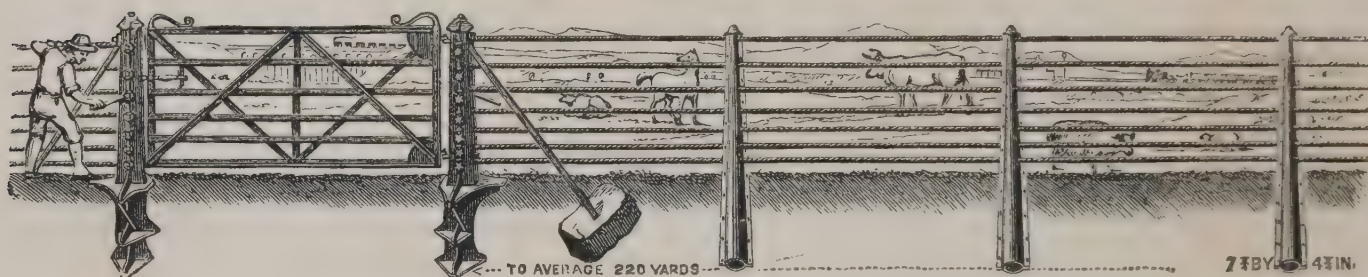


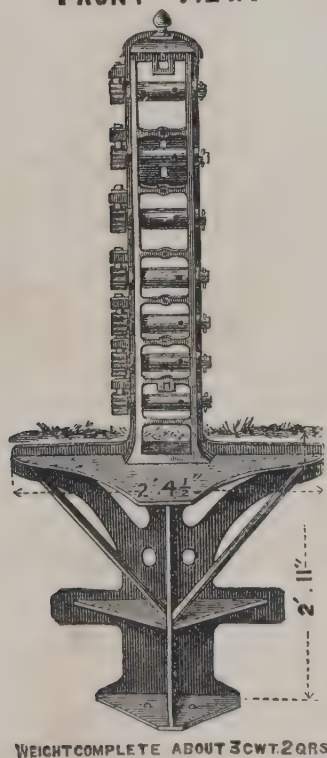
Fig. 5.



1.—STRAINED CABLE FENCE, STRANDS, and POSTS, all galvanized ; fitted with Francis Morton's patent winding straining pillars, and galvanized tapered oval iron posts—the strongest, most rigid, and durable form of iron fence known. Price 1s. 10d. per yard (see Fig. 5) and 2s. 2d. per yard. (See Fig. 10.)

Fig. 8.

FRONT VIEW.



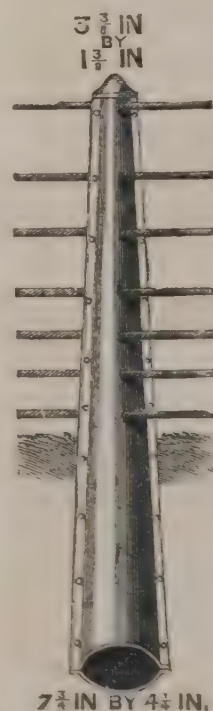
WEIGHT COMPLETE ABOUT 3 CWT. 2 QRS

2.—EXAMPLES OF PATENT WINDING STRAINING PILLARS, in cast and galvanized hammered iron. (Specially patented for India.) These powerful fencing pillars are self-acting, and specially adapted for straining every description of fencing wire, and are prepared for hanging field and level-crossing gates. They supersede skilled labour, and save more than half the cost of fixing wire fencing by any other method. Each pillar is entirely complete in itself, will stretch, and always keep perfectly rigid, without expense, from 400 to 500 yards of fence. Price 38s. to 45s. each. (See Fig. 8.)

3.—PATENT WINDING STRAINING BRACKETS (specially patented for India), for attaching to wood main posts, are extremely portable for long inland transport ; save two-thirds the cost of fixing by the ordinary mode ; while, like the patent winding straining pillars, they double the value and efficiency of the fence. (See Drawing.)

4.—EXAMPLES OF PATENT GALVANIZED TAPERED OVAL IRON FENCING POSTS (see Fig. 9) are the most complete and permanently efficient iron fencing posts in use. These galvanized iron posts are perfectly inflexible in every direction ; they cannot be bent, broken, or thrust aside by trespassers, or by the heaviest cattle. They are self-fixing, requiring no stone or wood blocks to fasten them.

Fig. 9.



5.—MODEL OF WROUGHT IRON SIDE STAY, for curves for bends in wire fencing. These, when fitted in the exhibitors' patent galvanized oval iron fencing posts, are concealed below the ground, thus removing a great defect and eye-sore hitherto inseparable from strained fencing.

6.—EXAMPLES OF BEST PREPARED GALVANIZED SIGNAL CORDS, as originally applied and manufactured by them in 1846.

7.—EXAMPLES OF BEST PREPARED GALVANIZED FENCING STRANDS, which have stood the test of 1 years' wear on railways, and are still in good condition.

8.—EXAMPLES OF WIRE ROPES for collieries, mine railways, &c.

DRAWINGS.—Illustrations of the various application of the exhibitors' patent strained cable fences and galvanized iron manufactures.

MORTON, FRANCIS, & Co.—*continued.*

9 & 10.—HALF-SIZE MODELS OF PATENT GALVANIZED OVAL TAPERED IRON TELEGRAPH POLES, specially patented for India. They possess great facility of transport, great strength and rigidity when fixed,

with simplicity of erection, superior electric action, reduced cost; and they save in fixing one-half the usual labour. (See Figs. 6 and 7.) *For further description, see next page.*

Fig. 6.

Nº 4.

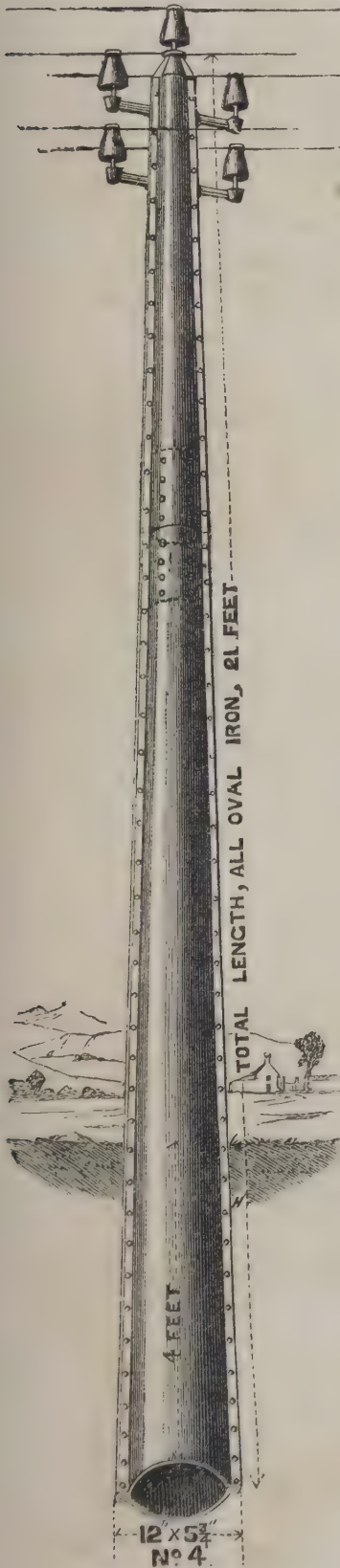


Fig. 2.



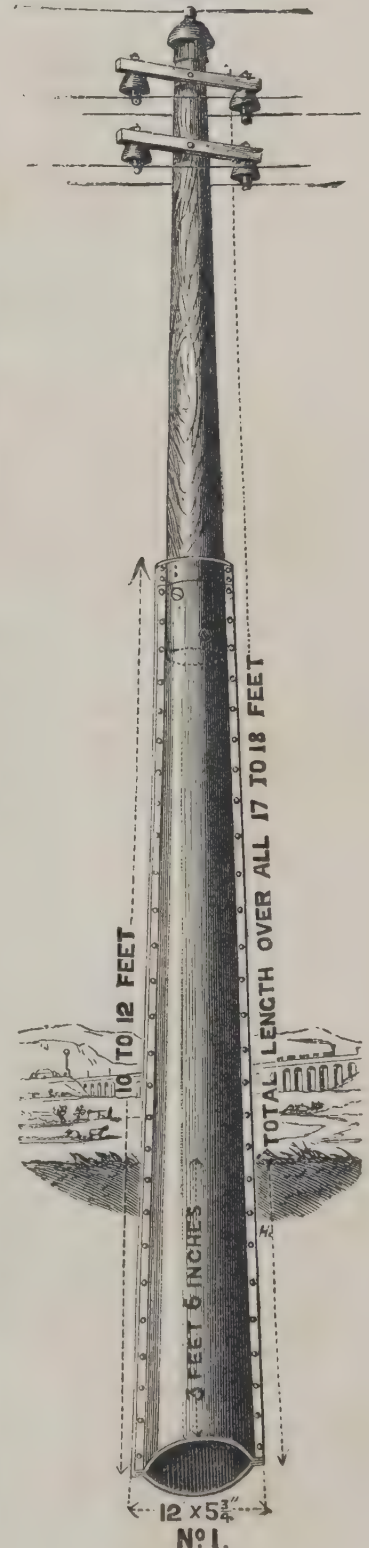
11.—MODEL OF COMBINED IRON RAILWAY FENCE AND TELEGRAPH.—This fence insures a large economy in first cost of construction, superior electric action from the use of iron in place of wood poles, and saves the heavy expense of future renewals and maintenance. Price 1s. 9d. and 1s. 10d. per yard of fence, including the galvanized iron telegraph poles.

Fig. 3



Fig. 7.

Nº 1



12.—MODEL OF "GARDENER'S OR FARM BAILIFF'S COTTAGE OF GALVANIZED CORRUGATED IRON."—Price, erected complete, with five rooms and entrance porch, £120. (See Fig. 3.)

13.—MODEL OF "ORNAMENTAL SHOOTING LODGE AND COUNTRY HOUSE" OF GALVANIZED CORRUGATED IRON.—Price, erected complete, with seven rooms, £350 to £400. (See Fig. 2.)

NOTE.—These iron buildings are easy of conveyance and erection where carriage and labour are very expensive, and, as constructed by Francis Morton & Co., possess all the comfort of stone or brick buildings.

MORTON, FRANCIS, & Co.—*continued.*

14.—DRAWING OF "FARM YARD," wholly covered with Francis Morton and Co.'s galvanized corrugated iron fire-resisting roofs. These iron roofs are economical in first cost, and are permanent. They save all cost of future repairs and maintenance, are not injured by violent

winds, removable without injury, and, above all, are fire-proof. Crops thus housed are protected from the ravages of vermin, wet, hail-storms, fire, and waste, and are thereby brought to market in the finest condition. Price of galvanized corrugated iron roofs to cover an



Fig. 1.

area of 100 feet square, delivered and erected complete on proprietor's wood wall plates and uprights, £370. All other dimensions estimated for.

15.—MODEL OF "GALVANIZED CORRUGATED IRON SHIP-YARD ROOF," 400 feet by 80 feet, as now erecting by exhibitors for Messrs. John Laird, Sons, & Co., Birkenhead, over their new dock in which the armour-plated Government war vessel "Agincourt" is being built. Estimates according to dimensions.

16.—DRAWING OF "VOLUNTEERS' DRILL GROUND," 300 feet by 70 feet, covered with galvanized corrugated self-supporting iron roofs. The method of construction here shown provides a large unbroken covered area at a greatly reduced cost. Estimates according to dimensions.

17.—MODEL OF "DOCK WHARF OR RAILWAY SHED,"

covered with galvanized iron tiles. The lightest and most convenient form in which this metal can be exported or used in this country; it can be laid by inexperienced workmen without difficulty. Price: Tiles 3 feet by 2 feet, £10 per 100, packed in cases.

18.—ILLUSTRATION OF "GALVANIZED IRON ROOFS," applied to railway stations of large span. Estimates according to dimensions. See Fig. 4.

19.—VARIOUS EXAMPLES OF "GALVANIZED IRON PLATES," for roofing and general purposes.

20. EXAMPLE OF FRANCIS MORTON & Co.'s "HEAVY CORRUGATED IRON FLOORING PLATES," for bridges, roadways, floors of fireproof buildings, &c., prepared to bear any required load. These plates, when substituted for the brick arches of fireproof floors, or when used for inside partition walls, not only reduce inside weight, but

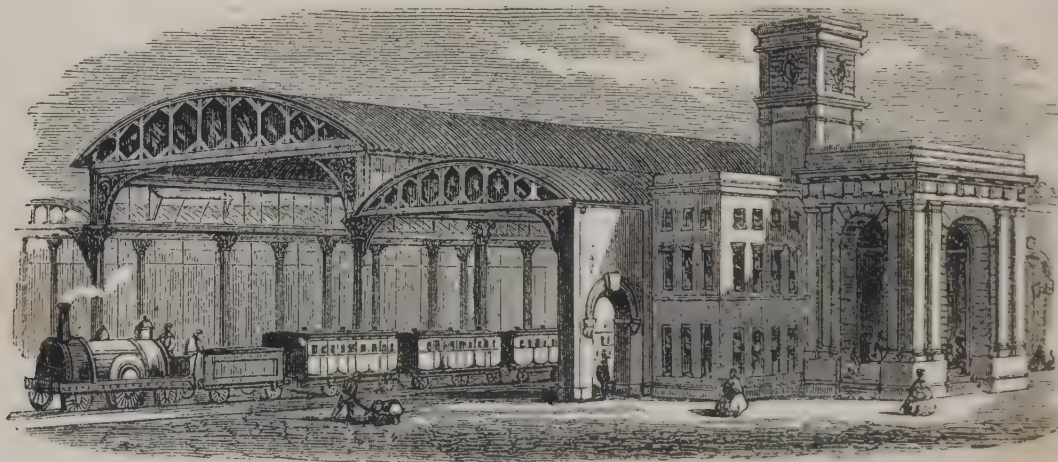


Fig. 4.

save much valuable space, and impart great lateral stiffness to the structure; their strength is not limited, as in plain wrought-iron plates, to short bearings only, as these heavy corrugated plates are prepared to take bearings varying from $4\frac{1}{2}$ to 10 feet.

21. EXAMPLE OF FRANCIS MORTON & Co.'s "PATENT GALVANIZED OVAL TAPERED IRON TELEGRAPH POLE," prepared to receive a wood top, &c. These poles, after the most severe testings, have been proved to be stronger than any other description of iron telegraph pole, while their lightness especially recommends them for long overland transport. The weight of these poles is only from 95lbs. to 100lbs. each, if made throughout entirely of iron, and 17 feet long. These poles are all manufactured of iron in its most enduring form, both as regards strength and its power to resist deterioration; they are also free from the slightest flexibility, no wear and tear

can arise at the joints, and having no loose or separate parts, nothing can be misplaced or lost in distribution overland.

22. EXAMPLE OF "PATENT GALVANIZED OVAL IRON TELEGRAPH POLE SOCKETS," prepared for use where wood poles are abundant. By putting the wood poles at present in use into these sockets as they decay at the ground line, the frequent heavy expenses incurred by the old lines of telegraph will be entirely saved; and as a much greater strength of a permanent character will be obtained by this means at the point where the strain is severest and decay the most rapid, the duration of the present wood poles will be more than doubled, and for the future a cheaper description of wood pole may be used, besides preventing accidents occasioned by storms, &c. These sockets are free from the uncertainties inseparable from cast-iron.

[2330]

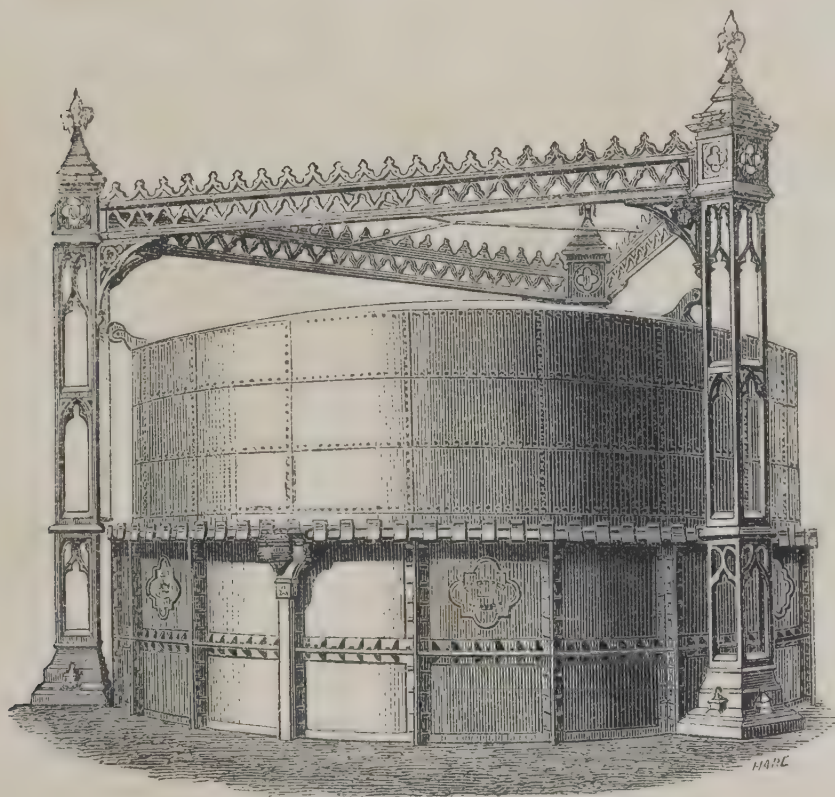
PERKINS, M. A., 6 *Francis Street, Regent Square, London.*—Warming and ventilating buildings by hot water.

[2331]

PILLAR, S. J., 91 *Newman Street, Oxford Street.*—Model bridges, pocket umbrella, &c.

[2332]

PORTER, J. T. B., & Co., *Lincoln, and 7 John Street, Adelphi, London.*—Gas works, for private use ; drawings of ditto, for towns, villages, &c.



SELF-ACTING GAS-HOLDER, FRAMEWORK, PILLARS, &c.

The exhibitors are manufacturers of patent portable coal gas works, by which any villa, farmhouse, mansion, country residence, railway station, church, or other isolated building where 10 lights and upwards are required, can be lighted by gas made upon the premises, the gas thus produced being cheaper than that obtained from ordinary public gas works, and so pure that it will not injure the most delicate fabric, or tarnish the most costly gilding. The cost of gas varies with the price of coal, from 2s. to 4s. per 1,000 cubic feet—prices one-sixth the cost of candles or oil for equal amounts of light. The attention required by these works is trifling, and need not incur additional labour, as any groom, undergardener, or other man-servant, can work the apparatus quite efficiently, in addition to his ordinary duties. Any kind of bituminous coal can be used, and the refuse of the household heap is available, the small coal being adapted to the purpose. The two sets of apparatus exhibited are for 10 and 50 lights respectively.

An apparatus for the production of gas from cannel coal, peat, or peat mixed with oil is also exhibited as particularly adapted to those countries where ordinary bituminous coal is scarce, and cannel coal may be obtained at less than £5 per ton.

Drawings of improved gas works for towns and villages are exhibited, showing the arrangement of the various portions of small public gas works.

The above engraving is an illustration of a self-acting gas-holder, framework, pillars, &c., designed and erected by Messrs. Porter & Co. for Messrs. Hodges & Co., at their distillery, Lambeth ; showing the application of design to the purposes of an ordinary gas-holder.

Messrs. Porter & Co. have erected and furnished from 100 to 200 gas works to which they can refer, and have also been honoured with prizes and medals from the Highland and Agricultural societies of Scotland and other societies in England, for their small gas works adapted to country residences and farm buildings.

[2333]

RAMAGE, ROBERT, 55A *Holywell Street, Millbank, Westminster, S.W.*—Glass and metal patent and other ventilators, &c.

[2334]

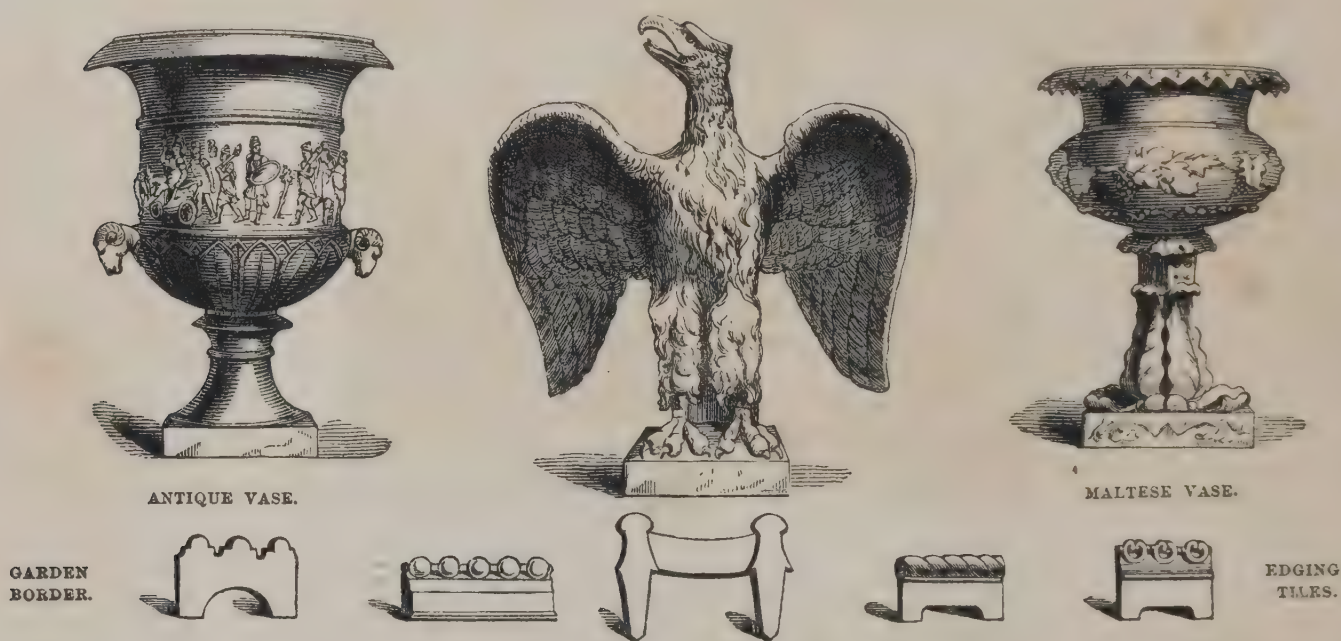
RENNIE, G., & SON, 6 *Holland Street, Blackfriars.*—Model of system of docking, in connection with floating gravingdocks.

[2335]

REYNOLDS, WILLIAM, *Sheffield.*—Artificial stone ; metallic mortar for building, painting, and plastering.

[2336]

ROSER, F. & G., *Ward's Wharf, Blackfriars, and Chelsea, London.*—Garden ornaments of artificial stone, and garden edgings in various materials.



The following are exhibited :—Garden border edging tiles in Terra-cotta, Terro-metallic, and Red ware.

ARTICLES IN ARTIFICIAL STONE.

Pair of lions.
Eagle.
Maltese vase.
Antique vase (Roman).
Acanthus vase.
Tulip vase.

Greyhound and leveret.
Triton boy.
Boy with dolphin.
Octagon gate terminal.
Trusses.
Specimens of balustrading.

[2337]

SCOTT, M., 26 *Parliament Street.*—Models of timber breakwater ; submarine foundations ; and a diving apparatus.

[2338]

SIEBE, AUGUSTUS, 5 *Denmark Street, Soho, London.*—Diving apparatus, as manufactured for Her Majesty's Board of Admiralty, &c. (*See page 33.*)

[2339]

SILICEOUS STONE COMPANY, PATENT, *Cannon Row, Westminster, and Works at Ipswich.*—Articles in artificial stone ; specimens of natural stone indurated by Ransome's process.

[2340]

SIMMONS, GEORGE, 7 *New Palace Yard, Westminster.*—Simmons' patent gas and water connector, full size. (*See page 34.*)

SIEBE, AUGUSTUS, 5 *Denmark Street, Soho, London.*—Diving apparatus, as manufactured for Her Majesty's Board of Admiralty, the Board of Ordnance and Crown Colonies; Imperial Navy of France and Ponts et Chaussées; Imperial Navy of Russia, Sweden, Turkey, America, and other maritime powers. Spring weighing machines, sportsman's stilyard, rotatory pump and syringe, self-pressure cocks, paper knotting machines, &c.

Obtained First-class Medals at the International Exhibitions of 1851, 1855.

The art of diving and remaining under water for a lengthened period is a subject which has occupied the attention of scientific men since the earliest records of history; but it was not until the early part of the 18th century that it began to assume a practical form in the shape of the cumbersome diving bell, which, although appearing in various forms in the hands of different inventors, was found inapplicable to the removal of wrecks and deep sea diving. It was not until the exhibitor (about 1830), in conjunction with Mr. Deane, invented the first diving equipment, professionally known as the "open diving helmet," that operations under water could be carried on with any degree of success. As the invention was not patented, and was in great demand, many imitators soon entered the field, but without introducing any new feature; it was left for the exhibitor to complete what he had begun by inventing the close helmet and dress, in 1837—the principle now generally adopted,



by which all danger of water entering the dress or helmet was removed. This he speedily followed up by adding the segmental neck screw, by means of which the head of the helmet can be removed by an eighth of a turn; also, the safety valve, to prevent water entering the dress in case of accident to the pipe; also by strengthening the pipes with a cylindrical coil of wire; adding water cistern to prevent the heating of the air pump cylinders, and many minor improvements; by the aid of which, the late Sir Chas. Pasley, C.B., was enabled, from 1839 to 1844, to carry on successfully the submarine operations to clear the anchorage at Spithead, and remove the wrecks of the "Royal George" and "Edgar," sunk respectively in 1782 and 1711. Although some hundreds of the exhibitor's improved close helmet have been twenty years in use, it is satisfactory to state that no death is recorded to have taken place from any cause connected with the apparatus.

[2341]

SLACK & BROWNLOW, *Manchester.*—Self-acting cistern filter.

[2342]

SMITH, ARCHIBALD, *Princes Street, Haymarket.*—Door spring for swing door; weather-tight casement fastening and water bar.

[2343]

SPARKES, J., 308 *Regent Street.*—Upright bench, for a working shoemaker; self-acting prismatic ventilator, for hall.

[2344]

STEPHENSON, WILLIAM, & SONS, *Newcastle-on-Tyne.*—Fire-clay, gas retorts, and fire-bricks, &c.

[2345]

STEWART, D. Y., & Co., *Glasgow.*—Cast-iron pipes.

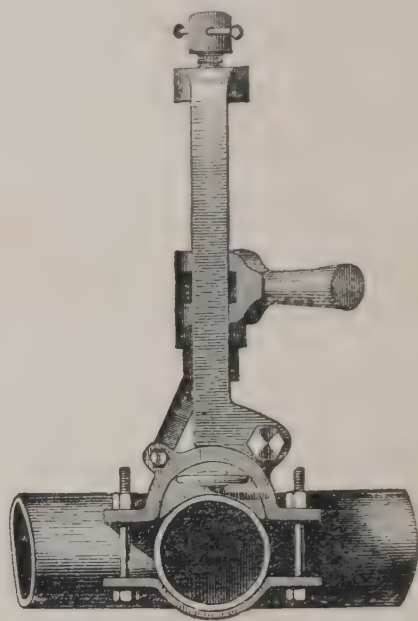
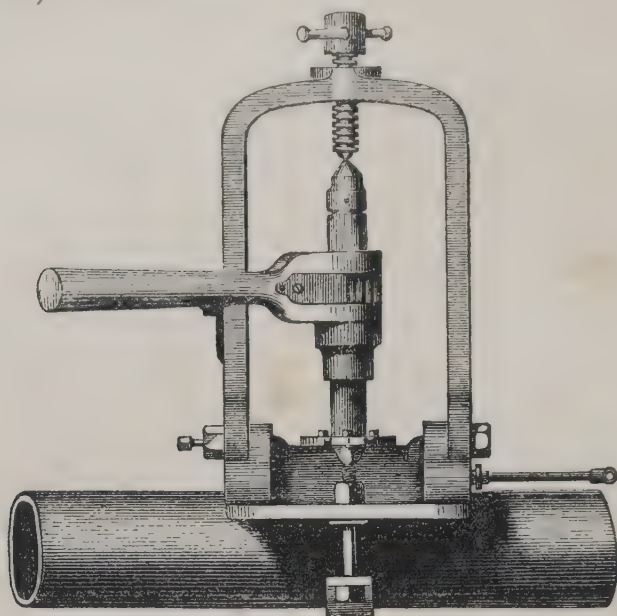
[2346]

STUTTER, C., *Woolpit, Suffolk.*—White and red facing bricks, stable clinkers, and other kiln goods.

[2347]

SZERELMEY, NICHOLAS CHARLES, *Laboratory, New Palace, Westminster, Pannonia Leather Factory, Park Road, Acre Lane, Clapham.*—Arabian, zopisso, and granitic preserving and indurating compositions. (See page 34.)

SIMMONS, GEORGE, 7 New Palace Yard, Westminster.—Simmons' patent gas and water connector, full size.



The escape of gas occasioned by the present mode of connecting services to mains, is costly to the gas companies, highly dangerous to the workman engaged, and hazardous to the property in the neighbourhood.

The gas companies now lose about one-fifth of the gas delivered from their works; and when it is remembered that gas under only one inch pressure escapes at the rate of 5,000 cubic feet per hour from a hole made to receive an inch and a half service, it is easily understood what a large proportion of this loss must be attributed to the service laying. The fire in Wood Street, City, February 27th, 1859, resulted from this operation, when property to the extent of upwards of £100,000 was destroyed.

At a meeting of the Metropolitan Association of Medical Officers of Health, held at Whitehall, Dr. Aldis stated "That the use of this machine would avert the risk of human life, as he could fairly testify, having seen it in operation in Horseferry Road, Westminster. One workman had been knocked down seven times in attaching service pipes, from the pernicious effects of the escape of gas on the present objectionable system."

J. COWDY, Manufacturer, 3A Bond Court, Walbrook, London.

This machine is the only connector whereby these risk can be avoided. It is so simple and compact, that the most unskilful hand can perform the work in about ten minutes, without loss or danger of breaking the main. Dr. Lankester, remarking upon this machine at the above meeting, said "that simplicity indeed was one of its highest recommendations, as it was in other inventions and the one before them would tend greatly to facilitate the supply of gas and water."

At present, no services can be attached to main charged with water; but by the use of this machine, the inhabitants may secure to themselves a continual supply.

It is useful for putting in temporary valves when a piece is required, or where a main is being re-laid without the gas or water in the same.

It is also convenient for steam pipe connections.

Connectors in stock with tools complete for

services, $\frac{3}{4}$ and $\frac{1}{2}$ inch	£6 6
Ditto, $\frac{3}{4}$ and 1 inch	8 8
Ditto, $1\frac{1}{4}$, $1\frac{1}{2}$ and 2 inch	12 12

Any other size can be made to order.

SZERELMEY, NICHOLAS CHARLES, Laboratory, New Palace, Westminster, Pannonia Leather Factory, Park Road, Acre Lane, Clapham.—Arabian, zopissa, and granitic preserving and indurating compositions.

1. *Wooden Railway Sleepers and Building Timber*, prepared so as effectually to resist dry rot and other decay.

The sleepers exhibited have been severely tested during the last ten years; some have been buried in the ground that period, some have been immersed in the sea for four years and a half. None of them exhibit the slightest indications of decay. The application of the process presents no difficulty, is remarkably cheap, and can be carried on in any part of the world without great expenses.

2. *Zopissa Composition for preserving iron and wooden ships and vessels*.—This valuable composition, in the case of wooden vessels, supersedes the use of copper sheathing, tar, and paint; it effectually closes the pores of the wood, excluding the air, and preventing the absorption of water. It forms a smooth bronze brown enamel surface, preventing the ravages of worms (*Torredo navalis*) and the attachment of barnacles. In iron vessels it completely prevents rust both within and without, and effectually closes the joints of the plates. It will last three times as long as all paints hitherto invented and used on iron vessels.

3. *Granitic Composition*, to be used as a paint for preserving iron from rust, and timber from decay. Is applicable to painting carriages, doors, chairs, corrugated iron roofs, iron houses, viaducts, bridges, railings, gutters, tanks, water and gas pipes, shutters, iron and wooden fences, telegraph posts, iron guns and shot,

whether in the open air, under ground, or otherwise. It never requires renewal, is applicable and effective in all parts of the world, and under every change of climate.

4. *Bricks* composed of sand and chalk, or sand and lime, or pure chalk. These bricks are made without burning, they are stronger and cheaper than ordinary bricks, and can be made with great rapidity by machine, which will turn out about 16,000 or 18,000 a day. The bricks are the invention of Mr. N. C. Szerelmey, and are manufactured for this country only by Messrs. Bodmer Brothers, Newport, Mon., and Thavies' Inn, Holborn, London.

5. *Silicate Zopissa Composition*, for preserving public and private buildings of stone, brick, stucco, or cement, statuary and other similar works of art, from atmospheric and other corroding and destroying influences.

This composition will at once arrest the progress of decay or chemical change, penetrate the surface, fill and consolidate it, and, by its cohesive powers, permanently seal it from the action of free gases, atmospheric air, and damp.

It has been successfully applied, amongst other buildings, to the inner courts of the New Palace of Westminster, the principal entrance of the Bank of England, the whole of the Kennington and Regent Square Churches, the Gresham Club House, City, the interior of St. Paul's Cathedral, &c. &c. &c.

[2348]

TAYLOR, WILLIAM J., *5 Church Street, Chelsea*.—Specimen of plastering, for external purposes, in Portland cement.

Improved and patented method of finishing Portland cement for walls of buildings and other erections, without the use of surface colour.

[2349]

THORN & Co., *Grosvenor Row, Pimlico, S.W.*—Atmospheric bells; Trinidad asphalte; specimen stone of old Westminster Bridge.

[2350]

TOD & M'GREGOR, *Clyde Foundry*.—Meadowside building yard and graving-dock, Glasgow. (For Engraving, see page 36).

Model of private graving dock and basin, showing also the various workshops connected therewith, designed for Messrs. Tod and M'Gregor by Messrs. Bell and Miller, Civil Engineers, Glasgow. The illustration on the following page represents the graving dock, dockyard, and premises. The large tidal basins, with wharves and quays, on the rivers Clyde and Kelvin, adjoining the building yard, have a depth of water sufficient to admit vessels of the largest tonnage for repairs, &c.

The dock is 500 feet long, 80 feet wide, with 20 feet water at spring tides. It is entirely built of squared masonry, freestone, and granite. The gates are of malleable iron, weighing upwards of 60 tons, and are of peculiar construction, hanging on pivots without the support of quadrant rollers. The bearing is not in the usual manner of hollow quoins, but a flat surface on heel-posts of planed cast-iron, shutting upon a polished face of the granite quoin stone—iron to granite, without the intervention of any softer material, and perfectly water-tight.

The tides on the Clyde fall only eight feet at springs, leaving ten to twelve feet water on the dock sill; this

renders necessary a heavy pumping engine of 250 horse-power, working two 52-inch pumps, which empties the dock in two-and-a-half hours, without waiting for the ebb.

The platform is kept clean, by the discharge from the pumping engine through the chambers in the masonry behind the gates.

The tidal basins and wharves have together 1,070 feet of quays constructed along the banks of the Clyde and Kelvin, with room for 650 feet additional. The whole water frontage is 2,400 feet.

The dockyard contains a complete arrangement of buildings and machinery, steam-hammers, &c., for repairing, entirely independent of the works in the building-yard adjoining. The total ground occupied by the building-yard and dockyard is twenty acres. There is sufficient accommodation to admit seven vessels of 3,000 tons each, repairing and fitting out at one time, besides those building on the stocks.

In addition to various cranes from five to twenty tons, there is a moveable steam crane capable of lifting eighty tons, for boilers and heavy machinery.

[2351]

TUPPER & COMPANY, *61A Moorgate Street, London, and Birmingham*.—Galvanized iron manufactures connected with building and architecture.

[2352]

TURNER, W., & GIBSON, J. W., *Dublin*.—Balance rolling bridges for railways over water and public roads; iron roofs, &c.

[2353]

VAVASSEUR, HENRY, & Co., *Sumner Street, Southwark, London*.—Galvanized, corrugated, and plain sheet iron, &c. (See page 37.)

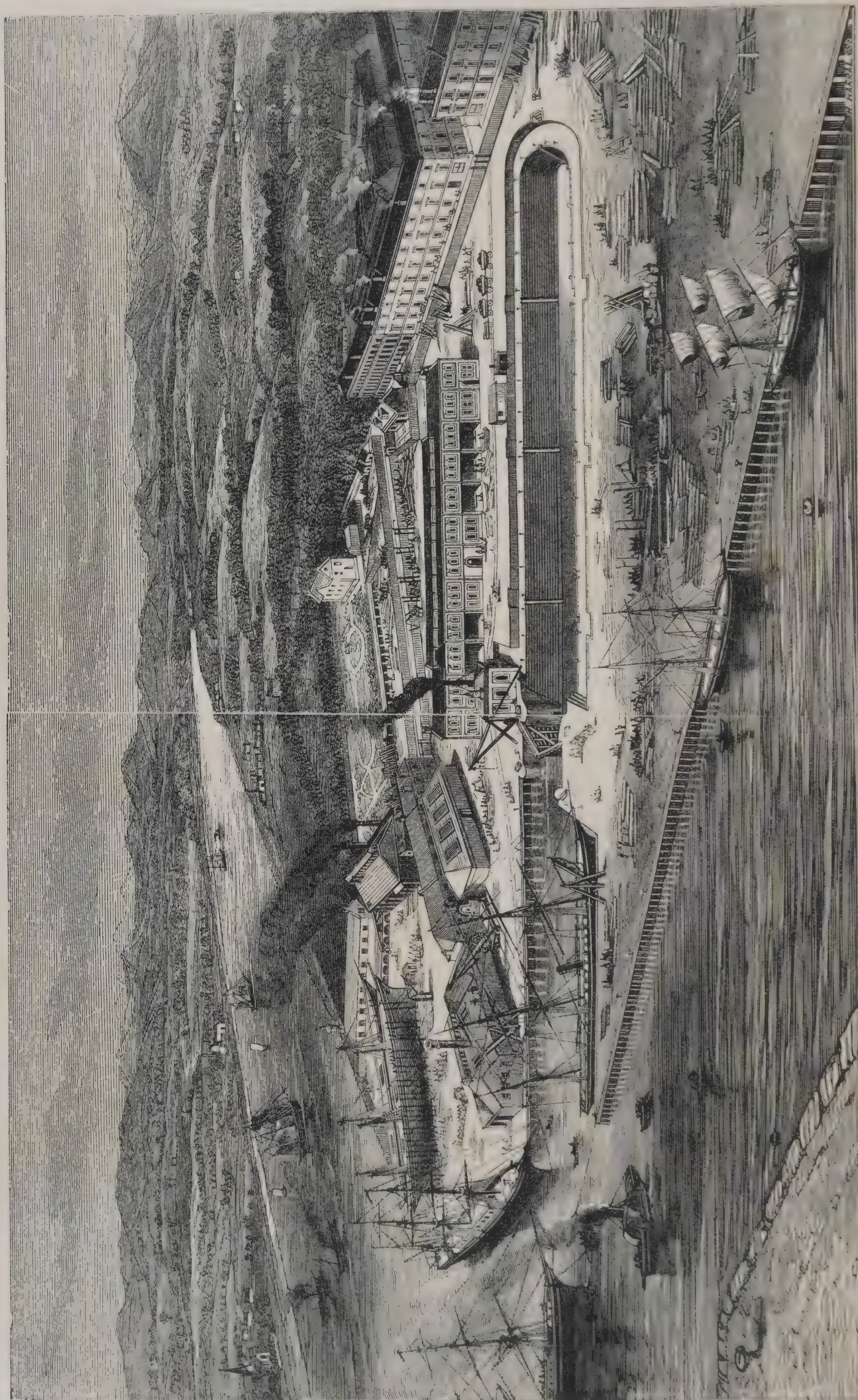
[2354]

VIGNOLES, C., *F.R.S., 21 Duke Street, Westminster*.—Models and drawings of Bilbao railway, Spain. (See pages 40 and 41.)

[2355]

VIEILLE MONTAGNE ZINC COMPANY, *Manchester Buildings, Westminster*. R. G. FISHER, Architect. F. BRABY & Co., Manufacturing Agents, *358-360 Euston Road, London*.—Models showing the use of zinc for roofing purposes. (See page 38.)

TOD & M'GREGOR, *Clyde Foundry*.—Meadowside building yard and graving-dock, Glasgow.



MEADOWSIDE BUILDING YARD AND GRAVING-DOCK, GLASGOW.

VAVASSEUR, HENRY, & Co., *Sumner Street, Southwark, London.*—Galvanized, corrugated, and plain sheet iron, &c., for building and roofing purposes, tanks, and cisterns.



AMSTERDAM STATION ON THE DUTCH-RHENISH RAILWAY.

No. 1. A sheet of galvanized iron, No. 16 gauge, corrugated, with a 10-inch flute, used in covering the Amsterdam station on the Dutch Rhenish Railway.

No. 2. A sheet of galvanized iron, No. 20 gauge, corrugated, with a 5-inch flute, as used in the construction of the Palace of Industry, Amsterdam.

No. 3. Specimen of galvanized iron roofing, used in covering No. 1 Slip in H.M. Dockyard, Portsmouth.

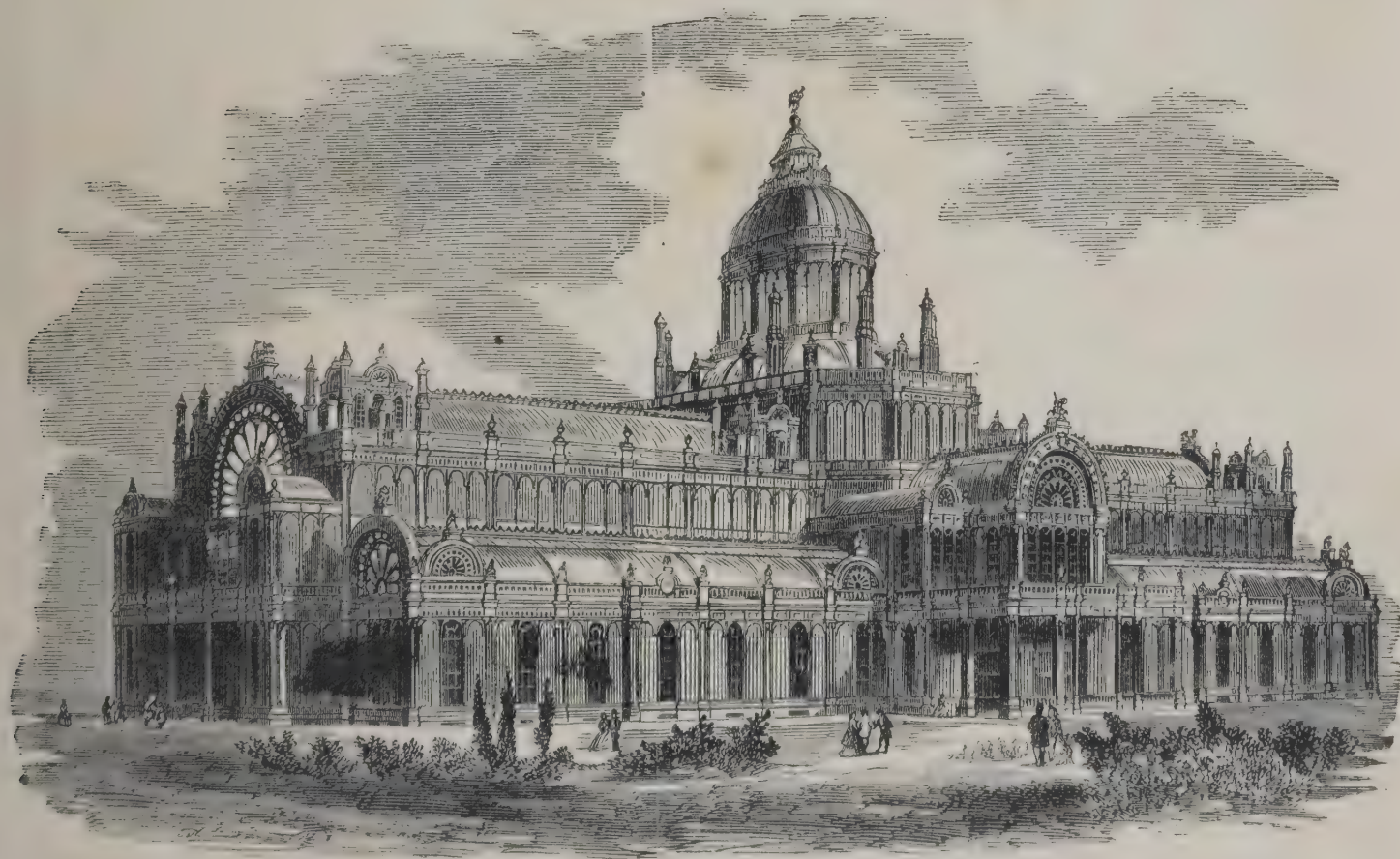
No. 4. A sheet of galvanized iron, No. 24 gauge, corrugated, and curved with a 3-inch flute.

No. 5. Case containing galvanized iron fittings for iron buildings.

No. 6. Galvanized iron tank.

No. 7. Galvanized iron cistern.

No. 8. Specimen of galvanized iron coffee-spouting.



THE PALACE OF INDUSTRY, AMSTERDAM.

Messrs. HENRY VAVASSEUR & Co. are contractors for every description of iron buildings.

VIEILLE MONTAGNE ZINC COMPANY, *Manchester Buildings, Westminster.* R. G. FISHER, Architect. F. BRABY & Co., Manufacturing Agents, 358–360 *Euston Road, London.*—Models showing the use of zinc for roofing purposes.

Models of zinc roofs, showing an economic system of framework, but having also due regard to strength. Corrugated zinc sheets, in extensive use for railway buildings. Sheet zinc, of superior quality, for roofing, each sheet bearing the stamp of “Vieille Montagne—F. Braby & Co.”

O G moulded zinc gutter. This form of gutter is well adapted to resist the action of the sun, and may be fixed either by screws or spikes, through zinc tubes, or by the ordinary brackets. It also gives an ornamental and architectural finish to the eaves of the building.

Semi-circular zinc gutter, for farm buildings and out-houses.

Rain-water pipes and heads of various forms.

Zinc water-balls for cisterns, much cheaper than copper, but equally efficient.

A zinc cistern.

Ornamental clock-case, made entirely of hammered zinc.

Roll and verandah caps, for making good the joints of sheets in covering roofs.

Braby's Italian-formed corrugated zinc.

Zinc wire—the thin for tying plants, the thick for laundries.

Zinc mouldings of various designs.

A zinc casement.

Speaking pipe and circular elbow.

Zinc ridging—durable, and far cheaper than lead or slate.

Zinc sash-bars for skylights, conservatories, garden hand-frames, church and cottage windows.

Casement bars.



MODELS FOR ROOFING PURPOSES.

The above shows section and elevation of Italian-formed zinc, as used for the verandah of the Horticultural Society's conservatory, and on the refreshment rooms of the Exhibition, &c.

Zinc friezes and frets for lamps, verandahs, ventilation and decorative purposes; replacing either lead or copper for these applications, and being cheaper, lighter, and more elegant in appearance.

[2356]

WALKER, JOHN, 32, *King William Street, City.*—Corrugated and galvanized iron in roofs, churches, &c.

[2357]

WALKER, C., & SONS, *Little Sutton Street.*—Gas valves, water valves, hydrants, regulating columns, &c.

SUB-CLASS B.—*Sanitary Improvements and Constructions.*

[2368]

ASKEW'S PATENT WINDOW SASH AND IMPROVED VENTILATION COMPANY.—A reversible ventilating window, of which both sides can be cleaned from within.



A REVERSIBLE WINDOW, OF WHICH BOTH SIDES CAN BE CLEANED FROM WITHIN.

The accompanying sketch shows some of the chief advantages derivable from the employment of this patent, which may be briefly enumerated as follows:—

1. The outside of the glass may be readily cleaned from the interior of the room, thereby effectually preventing the frightful accidents continually occurring to domestic servants and others, from standing or sitting on the outside sills.

2. A perfect system of ventilation, allowing the admission of air, even in windy weather, without the evils arising from a downward draught, rendering the invention peculiarly applicable to hospitals, barracks, and other large buildings, as well as to private dwellings.

3. Its extreme simplicity and non-liability to derangement, and the readiness with which it can be applied to existing window sashes.

4. The entire exclusion, at pleasure, of all draughts, not

only at the sides, but also at the meeting rails of the sashes.

It has already been used at Pembroke House; at the private residence of the Right Hon. W. F. Cowper, M.P., Chief Commissioner, Board of Works, 17, Curzon Street, May Fair; and at the residence of Mr. King, 19, Percy Street, Bedford Square; Messrs. Mappin Brothers, King William Street, London Bridge; Messrs. Dakin and Co., St. Paul's Churchyard; Messrs. Parkins and Gotto, Oxford Street; Mr. Cox, Southampton Row, Russell Square; Mr. Edgley, 3, Serjeant's Inn, Fleet Street; Mr. Tilbury, Ferdinand Street, Kentish Town; Mr. Magotti, 76, Seymour Street; and at St. Thomas's Hospital; and in every case the inventor has given unqualified satisfaction.

Applications to be made to the Secretary, at the Offices of the Company, 9 Adam Street, Adelphi, W.C.

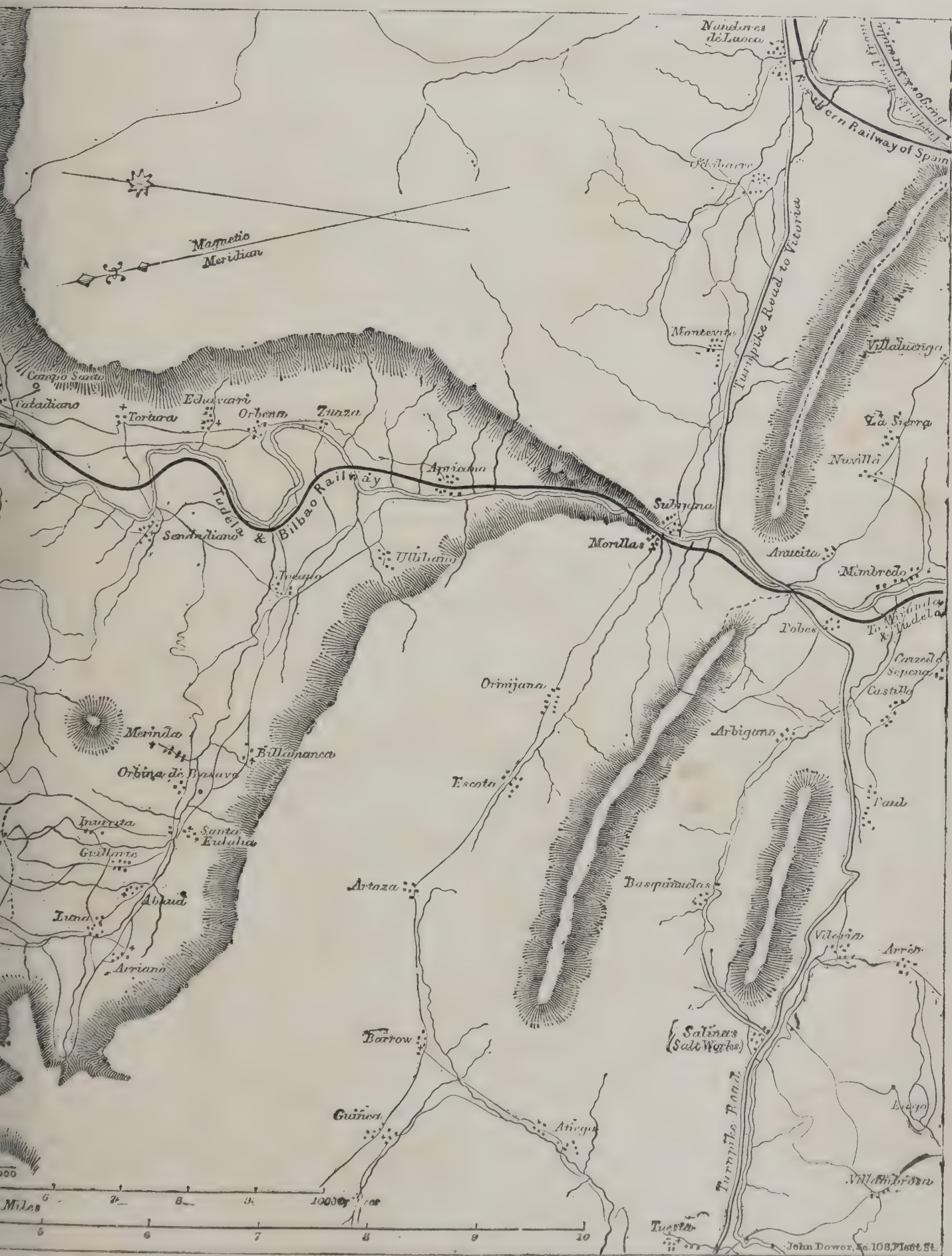
This is a detailed topographical map of the Go-wea Mountains region. The map features the Tudela & Bilbao Railway as a prominent dark line, with several branches extending to various towns. The Turupike Road is also shown as a major thoroughfare. The terrain is characterized by numerous mountain peaks, some of which are labeled with names like 'Fluque of Go-wea Mountains (Summit 5,200 ft.)'. Rivers and streams are depicted with wavy lines, and various towns and villages are marked with dots and labeled, including Tudela, Bilbao, and many others. A scale bar at the bottom right indicates distances in meters, ranging from 0 to 2000. The map is oriented with North at the top.

HENRY MONTAGUE MATHEWS, } District Engineers.
CHRISTOPHER BENNISON, }
THOMAS VIGNOLES CROUDACE, Assistant Engineer.

Horizontal Scale of M
Vertical Scale of M
Minimum Radii of Ra

VIGNOLES, C.—continued.

TUDELA AND BILBAO RAILWAY.



THE PYRENEES, THROUGH THE BASQUE PROVINCES, IN THE NORTH OF SPAIN, 1862

, F.R.S., ENGINEER-IN-CHIEF.

1 mile—1 inch to 4163 feet.
1 inch to 1663 feet.
Steepest Gradient, 1 in 70.

HENRY VIGNOLES, Principal Resident Engineer.
PERCIVAL SKELTON, Artist.
STEPHEN SALTER, Modeller.

[2369]

BAZALGETTE, JOSEPH WILLIAM, *Spring Gardens*.—Drawings of the metropolitan main drainage, sewers, and intercepting works.

[2370]

BEAGLE & Co., 71 *Cannon Street, West, London*.—Patent ventilator, for public and private buildings.

[2371]

BEAUMONT, EDWARD BLACKETT, *Darfield Pottery, Barnsley, Yorkshire*.—Sanitary tubes: terra cotta gas retorts, fire-bricks, filters, &c.

The following articles, of which specimens are exhibited, are manufactured at this Pottery, viz. :—

Sanitary tubes, from three inches to four feet in diameter. These tubes are tested, when required, to bear a pressure of 200lbs. to the square inch.

Fire bricks, gas retorts, vases, and terra cotta ware of every description. This clay is peculiarly adapted for the construction of chemical vessels, and for other purposes where resistance to the action of acids is required.

[2372]

BODMER BROTHERS, *Newport, Monmouthshire*.—Bricks, and other objects used for building, made of unburnt artificial stone.

These bricks are made chiefly of sand and lime, intimately incorporated with each other in suitable proportions, and subjected to great pressure in moulds. Furnace cinders, burnt clay, or other materials of a similar nature, may, however, be substituted for the sand, with excellent effect.

Instead of disintegrating or deteriorating on exposure to the atmosphere, these bricks, in consequence of a chemical process of induration, which commences almost immediately after the materials have been compressed, improve, and are gradually converted into stone. They absorb very little moisture, and are capable of withstanding any frost, however severe, after having once become indurated to a certain extent: properties which numbers of burnt clay bricks cannot be said to possess.

The patent stone bricks can also be highly recommended on account of their accurate shape—which they preserve precisely as imparted to them by the moulds of the press; and owing to which their use effects a great saving of mortar or cement. They are also commendable for their handsome appearance and pleasing colour; the latter resembling that of freestone. Partition walls made with these bricks require no plastering, and can be hung with paper without any further preparation.

For structures under water, and for coal pits, sewers, wells, and works of a similar description, these bricks are pre-eminently adapted, as they can be made perfectly water-tight.

Black and other coloured bricks can also be produced.

[2373]

BOURNE VALLEY POTTERY COMPANY, *Nine Elms, Vauxhall*.—Sewage pipes.

[2374]

BROOKS, B. & R., & SMITH, J., 154 *Goswell Street*.—New invented sash bars for windows.

[2375]

BURTON & WALLER, *Holland Street, Southwark*.—Gas and water drainage apparatus.

[2376]

CHANTRELL, GEORGE FREDERIC, 6 *Hatton Garden, Liverpool*.—Chantrell and Dutch's water-closet, &c. (*See page 45.*)

[2377]

CHEAVIN, S., *Pen Street, Boston*.—Patent double action rapid belt water purifier; damp proof paints and cement, &c.

[2378]

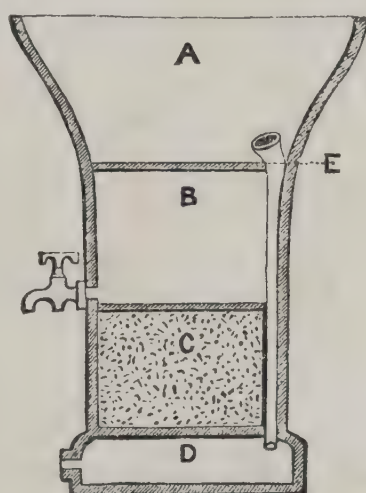
CLIFF, JOHN, & Co., *Imperial Potteries, Princes Street, Lambeth, London, S.*

Chemical vessels, pharmaceutical apparatus, &c. &c. to order.

Brown and white stoneware of all descriptions. Illustrated price lists will be sent on application.

Obtained large Medals at the Exhibitions of 1851 and 1855.

"The Jury noticed with great commendation the care and attention bestowed by these exhibitors on chemical and other apparatus."—(*Extract. See Jurors' Report, Class 27, p. 583.*)



PATENT FILTER BY ASCENSION.

The large jar exhibited in Paris by this firm is in use in the present Exhibition building as a sherry butt, in the cellars of the Refreshment Department, and is the largest stoneware vessel in the world in actual service.



GREAT EXHIBITION OF 1851.

(*Extract. See Jurors' Report, Class 25, p. 541.*)

"Stephen Green & Co., Lambeth. This firm exhibits some very remarkable specimens of stoneware, of great size, designed for the use of breweries, distilleries, &c., and which, on account of their hardness of glaze and other qualities, are of great value in many processes of chemical manufacture." The Jury have awarded a Prize Medal.

(*Extract. See Jurors' Report, Class 27, p. 583.*)

"Although by the decision of the constituted authorities the Medal which has been awarded to Messrs. Stephen Green & Co., in Class 27, has been withdrawn in favour of the similar honour awarded by the Jury of

Class 25, the author of the present report cannot pass on to other exhibitors without giving some account of the objects which chiefly attracted the attention of his Jury. These are the large jar, the condensers, the air-tight stoppers, and the acid pump, exhibited within the Building; and the whole apparatus of the retort placed outside. The condensers are not only large, but perfect, and the spherical stopper and valve are so ground as to be perfectly air-tight, and must be regarded as an admirable and most useful contrivance. The jar is perhaps the largest piece ever manufactured in this ware." The Jury noticed with great commendation the care and attention bestowed by these exhibitors on chemical and other apparatus.

Imperial Potteries, Lambeth, London.

[2379]

COOKE, WILLIAM, Civil Engineer, 26 *Spring Gardens*.—Ventilating and sanitary appliances; inexpensive, and of general utility.

Apparatus for effecting ventilation without dust or draught. This invention is self-acting, simple, and inexpensive, is always in its place, gives no trouble, is not liable to damage or derangement, admits an unceasing and imperceptible supply of pure air without dust or

draught, and may be used with safety in sick rooms and sleeping apartments during the night. When out of use it is out of sight.

It is equally applicable to apartments, buildings, and carriages.

[2380]

DALE, THOMAS, *Manager, Great Yarmouth Water Works*.—Improved service-box for supplying water-closets, and preventing waste.

[2381]

DANCHELL, F. HAHN & Co., 38 *Red Lion Square*.—Filtering, water-softening, and water-testing apparatus.



WATER PURIFYING APPARATUS.—The following are exhibited:—

CISTERN FILTERS.—To be placed direct into house cisterns, and capable of yielding from two quarts to two gallons of water in a minute, according to size.

FOUNTAIN FILTERS.—To be connected either with the service-pipe direct from the main, or with the supply-pipe from the cistern, and capable of yielding from two quarts to two gallons per minute, according to size.

PORTABLE HOUSEHOLD FILTERS of stoneware, from one to ten gallons size.

PORTABLE TABLE FILTERS of porcelain, earthenware terra cotta, &c., from one to four gallons size.

SELF-REGULATING APPARATUS for softening water to be placed in cisterns, and constructed for softening from 100 to 100,000 gallons of water per diem.

WATER-TESTING APPARATUS, requiring no knowledge of chemistry, to ascertain the presence in water of any deleterious substances in solution. Arranged for domestic use, hydraulic engineers, sanitary officers, and others.

Having the contract for supplying the Exhibition with filtered water, numerous very novel designs in VASE and FOUNTAIN FILTERS will be found in use in various parts of the building.

For information on the subject of purification of water with reference to the above articles, see a "Treatise on Water, its Impurities and Purification," by F. Hahn Danchell; published by Renshaw, 356 Strand.

G. Kent, Sole Manufacturer, 199 High Holborn.

CHANTRELL, GEORGE FREDERIC, 6 *Hatton Garden, Liverpool*.—Chantrell & Dutch's water-closet, combining slate cistern, basin, and trap with patent flushing apparatus.

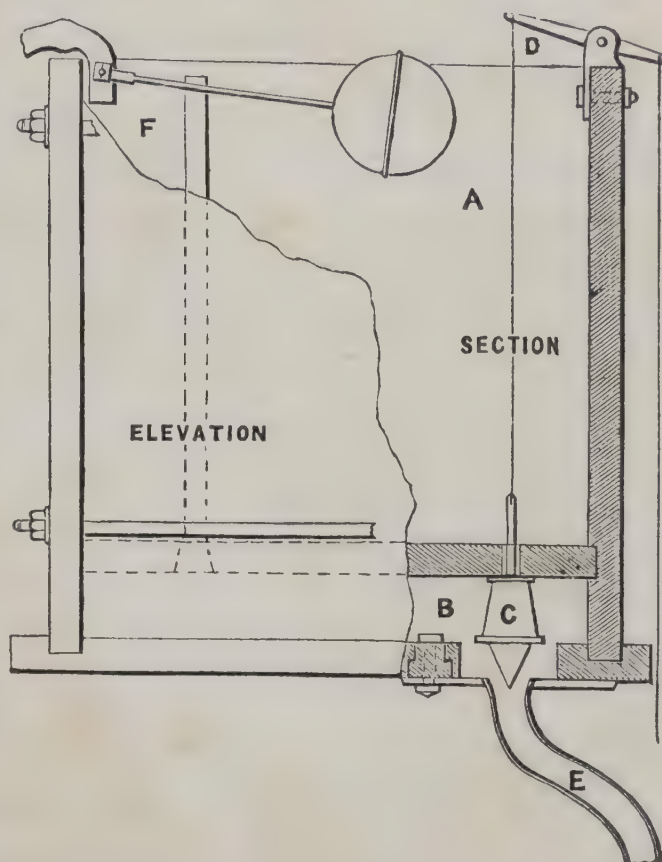
This apparatus is strong, durable, efficient, and exceedingly cheap, and prevents waste of water. Price—with thirty-gallon slate cistern, measuring-box, solid double valve with vulcanised india-rubber washers, overflow and air pipe, flushing pipe and connections, improved hopper basin and trap, self-acting motion and ball-valve for main supply, complete and ready for fixing—£3. A liberal discount allowed to the trade.

It may be readily fixed and examined, by merely unscrewing the lower valve-seat, by any ordinary skilled workman.

Large-sized cisterns and other descriptions of cisterns in proportion.

The inventors, after many years' practical experience in sanitary matters, find that a cistern is indispensable; for with any one charge system, should the closet be used when the main supply is off (which is very often the case), it becomes foul. The self-acting principle in this apparatus (as shown) being strong, and free from complications, always insures a thorough flushing of the closet at the time of use.

A, cistern with double bottoms, forming measuring chamber, B, between which the double valve, C, acts, which is held in the position shown by the seat of the closet; the latter is weighted at the back, and, when used, merely drops half an inch in front, acting upon the lever, D, closing the outlet to E, opening the inlet from A, charging B. When the seat is free, the valve returns to its former position; the water accumulated in B flushes the closet (or urinal, to which it is also adapted). E, flushing pipe; F, air and overflow pipe.



[2382]

EDWARDS, FREDERICK, & SON, 49 *Great Marlborough Street, London, W.*—Models and drawings of an improved method of constructing chimneys and ventilation.

[2383]

FIELD & ALLEN, 27 *Frederick Street, Edinburgh*.—Articles for housebuilding purposes.

[2384]

FINCH, JOHN, 11 *Adam Street, Adelphi*.—Patent Porcelain Bath, designed by his late Royal Highness Prince Albert (Rufford and Finch, patentees).

Obtained a Medal at the Great Exhibition, 1851, "for Baths, &c." Gold Isis Medal of the Society of Arts, 1850.

Patent Porcelain Bath designed by His late Royal Highness the Prince Consort. This Bath is patronised by H. R. H. the Duke of Cambridge for Her Majesty's war department; by the Emperor of the French, the Emperor of Russia, Lord Palmerston, &c., and is extensively used in public institutions and private houses.

Patent Porcelain Housemaid's and Kitchen Sinks.

These are made from the suggestions of Miss Florence Nightingale, and are not liable to the complaint made of the ordinary sink in her valuable "Notes on Nursing." "The ordinary oblong sink is an abomination. That great surface of stone, which is always left wet, is always exhaling into the air. I have known whole houses and hospitals smell of the sink."

[2385]

GOTTO, FREDERICK, Architect, *Leighton Buzzard, Bedfordshire*.—Gotto's self-discharging effluvia trap.

[2386]

JENNINGS, GEORGE, *Holland Street, Blackfriars Road*.—Domestic, sanitary, and building appliances, tending to comfort and health.

[2387]

KEY, E., *Sharrington, viâ Thetford, Norfolk*.—Models of country cottages.

[2388]

KEYNSHAM BLUE LIAS STONE AND CEMENT COMPANY, 6 *Martin's Lane, Cannon Street*.—Samples of blue lias lime.

[2389]

KITE, C., 20 *Liverpool Street, King's Cross*.—Improved chimney tops, ventilators, and stable requisites.

[2390]

LIPSCOMBE, FREDERICK, & Co., 233 *Strand, near Temple Bar*.—Patent self-cleansing charcoal water filters.

[2391]

LOVEGROVE, JAMES, *Town Hall, Hackney, N.E.*—Trap to prevent effluvia from drains and gulleys.

Lovegrove's patent drain traps and ventilating valves have been applied to noblemen's mansions, public buildings, dwelling-houses, stables, garden paths, and street gullies, with complete success, and in every case have effectually prevented the escape of foul air from sewers and drains.

	s.	d.
Nine-inch outlet traps, to be fixed at junction of drain with sewer . . .	15	0
Six-inch ditto	12	6
Nine-inch ditto, to be fixed beneath an area, or in line of drain, if more convenient	15	0
Six-inch ditto	12	6
Air supply, post, and valve	7	6
Cistern waste pipe traps	7	6

	s.	d.
Garden and yard sinks, with valve and cesspit complete	9	6
Iron stable traps, 11 × 11 ditto . . .	15	0
Rain pipe, closet valve	5	6
4-inch P traps, with valve	5	6
Iron area or yard sink, 9 × 4, with valve	7	6

Architects and surveyors should specify the drains to be trapped and ventilated with Lovegrove's traps and ventilating valves.

Orders for fixing under the instructions of the inventor must be forwarded to J. Lovegrove, Civil Engineer, Surveyor, Town Hall, Hackney, N.E.

The traps may be obtained at Jennings' Dépôt, 5, Holland Street, Blackfriars, S.E.

[2392]

M'KINNELL, JOHN, 15 *Langham Street, London*.—Patent ventilator, for buildings of all kinds, ships, and carriages.

Models are exhibited showing the application of this ventilator. 1. In upper apartments. 2. In floors where the joists run from wall to wall. 3. Where girders intervene. 4. Where the fresh air is supplied horizontally, and the vitiated discharged at the ridge, as in the

Royal Chapel and the Queen's School, Windsor Park. 5. In ships, as it has been adopted by Her Majesty's Emigration Commissioners.

Ventilators in various forms.

Economic Gas Regulators.

[2393]

MOORE, JOSIAH, 81 *Fleet Street*.—Ventilators for houses.

[2394]

NIXON, T., *Kettering, Northampton*.—Greenhouse.

[2395]

PIERCE, WILLIAM, 5 *Jermyn Street, London*.—Huthnance's patent heating apparatus, for drying rooms, &c.; sanitary improvements in stove grates for hospitals, cottages, &c.

Obtained Prize Medal at the Exhibition of 1851.

[2396]

PRITCHARD, WILLIAM, 3 *Ware Street, Kingsland Road, N.E.*—Patent life-protecting machine for cleaning windows.

The object of this apparatus is to secure to domestic servants immunity from the risks to life and limb incurred in window cleaning. It is at once simple, effec-

tive, and inexpensive. It can be applied to any window in town or country, at the very trifling cost of £2 and upwards.

[2397]

RIDDELL, JOSEPH HADLEY, 155 *Cheapside, London*.—Patent portable cooking stove, and patent slow combustion heating stove.

[2398]

ROBSON, W., *Newcastle*.—Firebricks, &c.

[2399]

ROSSER, SAMUEL EGAN, *Percy Chambers, Northumberland Street, Strand, London, W.C.*—Warming, ventilating, and desiccating apparatus.

[2400]

SILICATED CARBON FILTER COMPANY, *Bolingbroke Gardens, Battersea, London*.—Silicated carbon filters, for universal application (Dahlke's patent).

[2401]

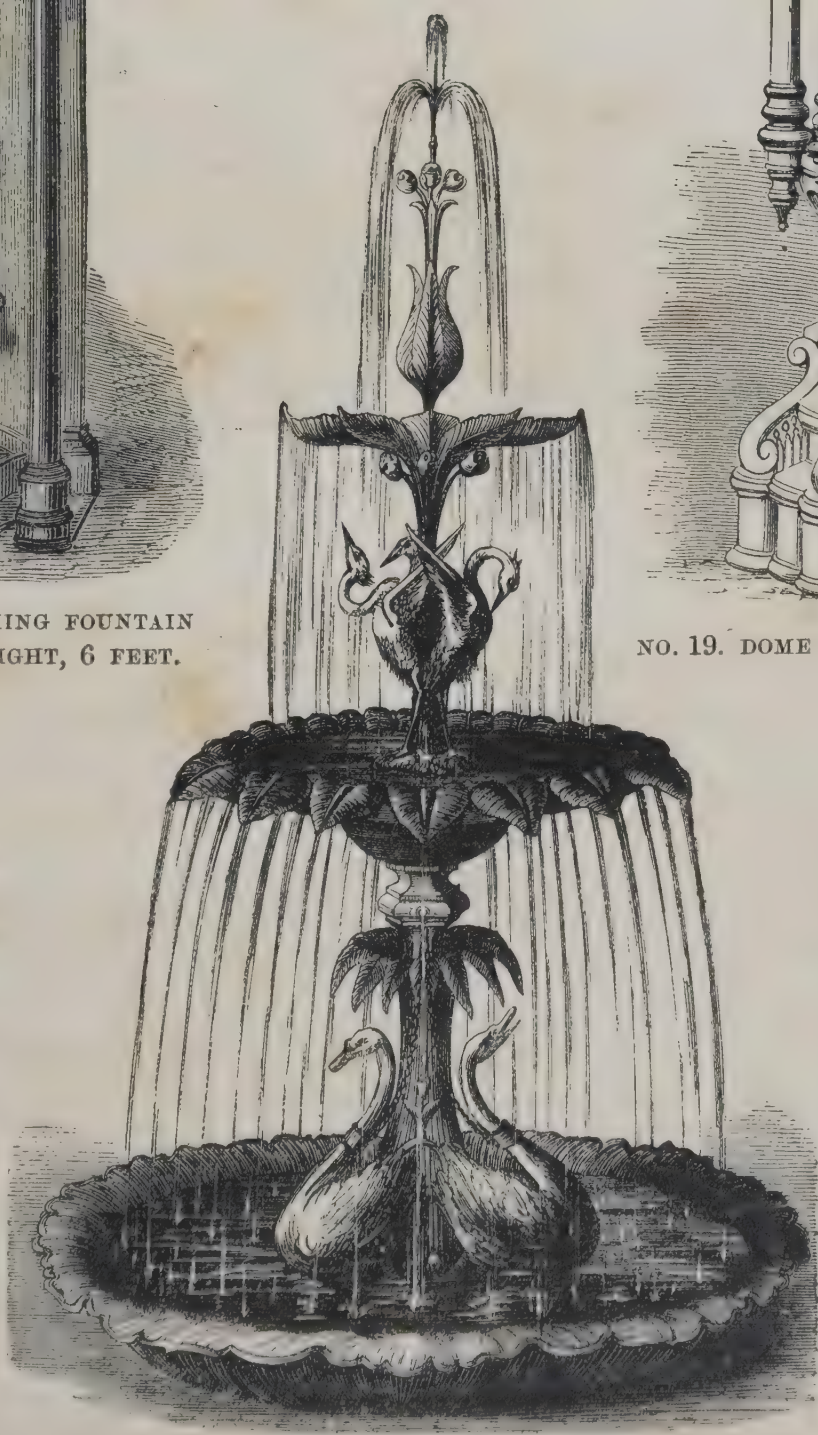
SMITH, GEORGE, & Co., *Sun Foundry, Glasgow.*—Patent composite grave monuments and tablets, and ornamental drinking fountains in iron. Sanitary structures, such as baths and dry-deodorising closets and stable-fittings.

Manufacturers of rain-water goods, and all kinds of cast-iron fittings for plumbers' and architectural purposes, and patentees of GEORGE SMITH & Co.'s patent baths, bath stands, and lavatories, dry-deodorising closets, commodes, urinals, patent composite grave monuments and tablets; also cast-iron plain and ornamental fountains, cattle troughs, and their registered improved stable fittings, which were selected by the late Prince Consort for Holyrood Palace stables, and for which first premium was awarded at the Royal Highland and Agricultural Shows.

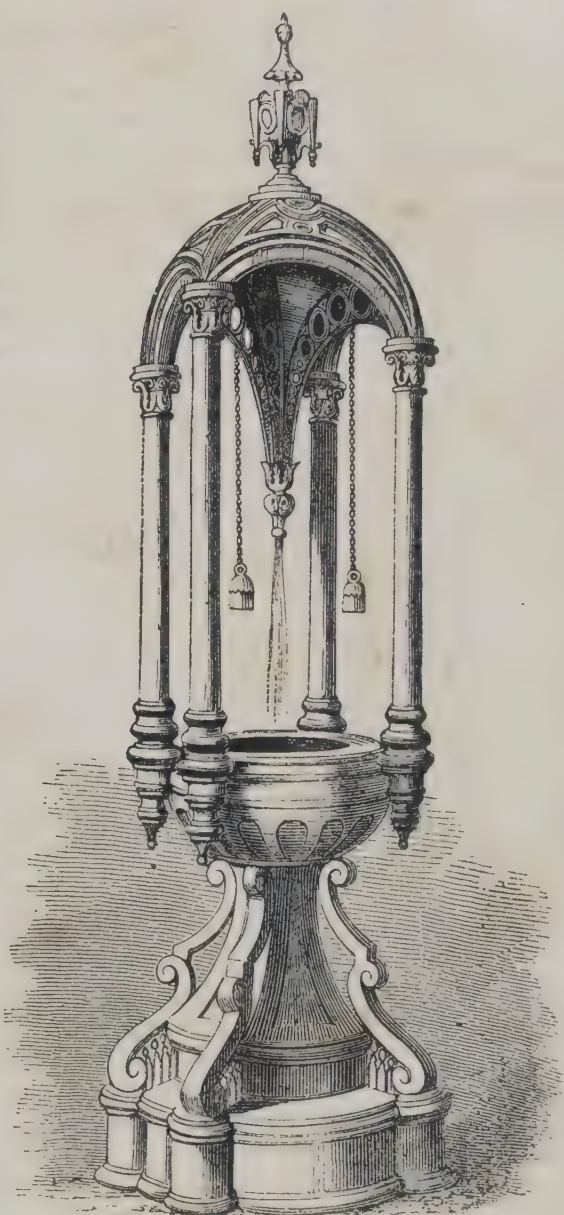


NO. 14. ORNAMENTAL DRINKING FOUNTAIN FOR WALL PURPOSES. HEIGHT, 6 FEET.

The exhibitors are iron-founders, and constructors of patent sanitary appliances. They manufacture and exhibit specimens of ornamental jet fountains in cast-iron for gardens, squares, &c.; ornamental drinking fountains in cast-iron for streets, squares, stations,



NO. 12. ORNAMENTAL FOUNTAIN. HEIGHT, 10 FEET. DIAMETER OF TROUGH, 7 FEET.



NO. 19. DOME FOUNTAIN. HEIGHT, 6 FEET.

public works, &c. Selections from the designs of Messrs. George Smith & Co. have been adopted in the following towns:—Glasgow, Edinburgh, Perth, Inverness, Dublin, Belfast, Liverpool, Manchester, Birmingham, Leeds, and others.

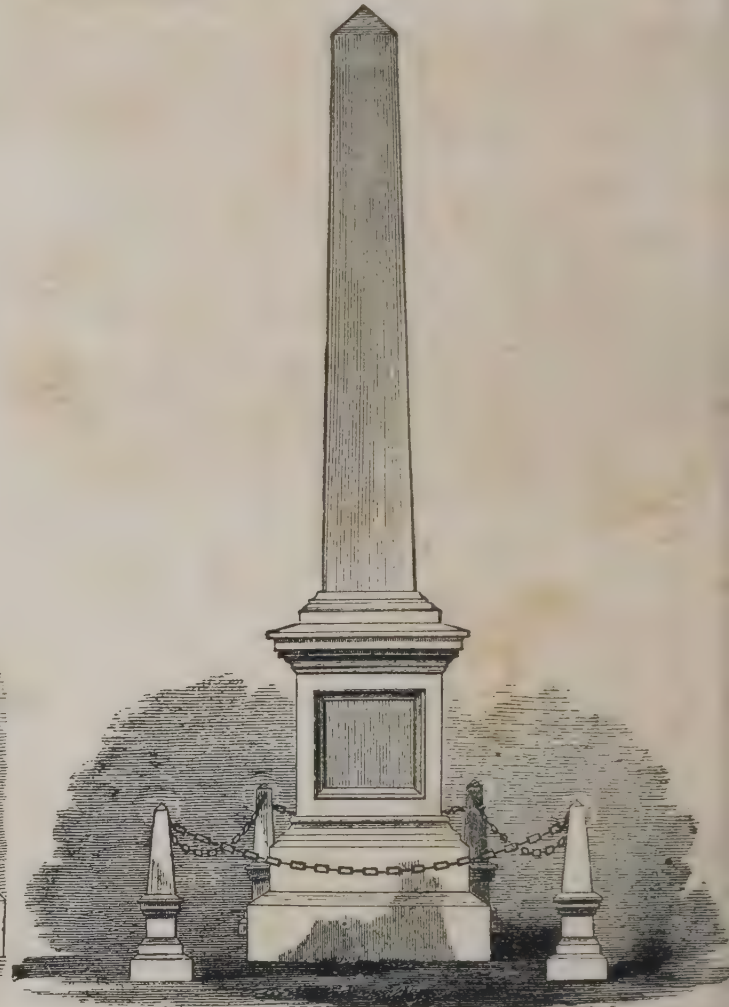
SMITH, GEORGE, & Co.—*continued.*

Patent composite grave monuments and memorial structures. In these monuments panels of marble, stone, or slate, upon which inscriptions can be engraved

either before or after erection, are combined with ornamental cast-iron framework capable of the simplest or most elaborate designs, at extremely moderate cost.



GRAVE MONUMENT.

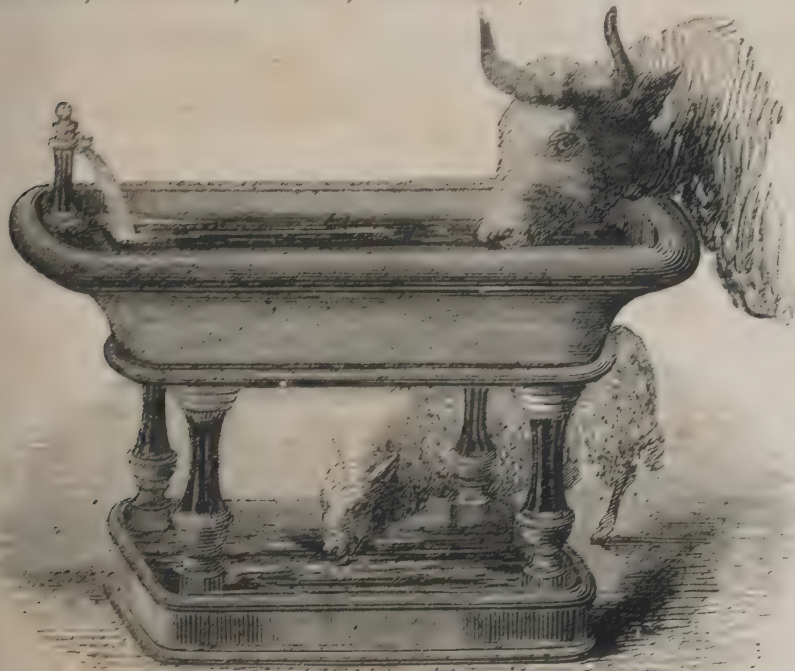


MEMORIAL OBELISK.

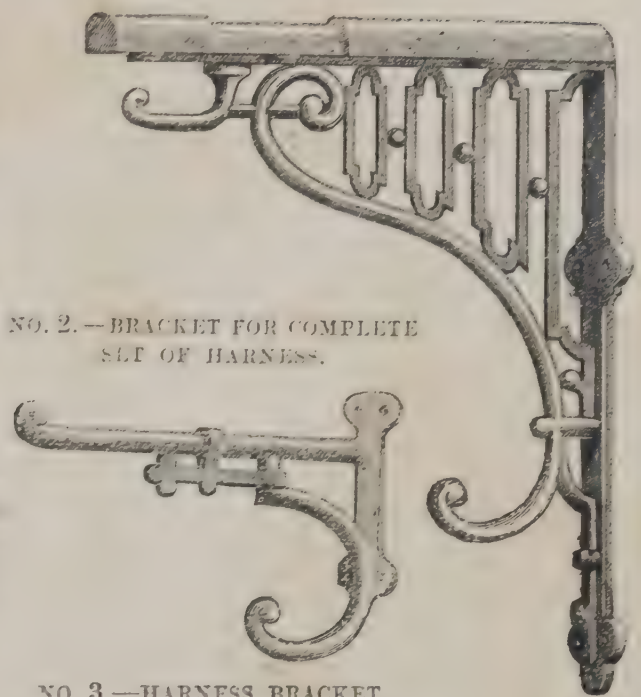


EMBLEMATIC TOMB RAILING.

SMITH, GEORGE, & Co., *continued.*

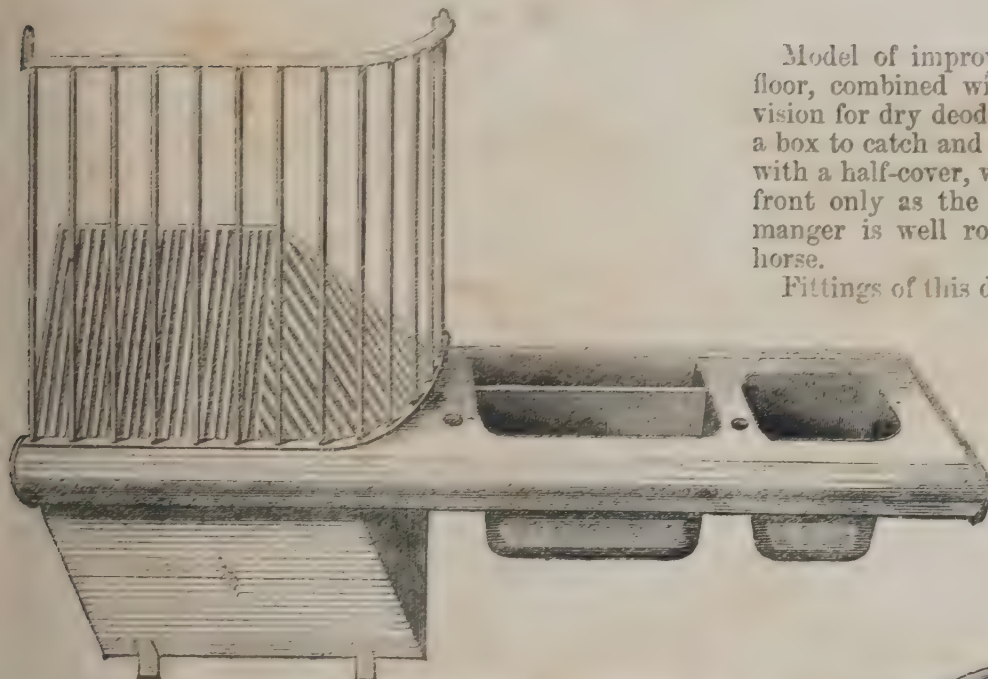


NO. 15.—CATTLE TROUGH.



NO. 2.—BRACKET FOR COMPLETE SET OF HARNESS.

NO. 3.—HARNESS BRACKET.

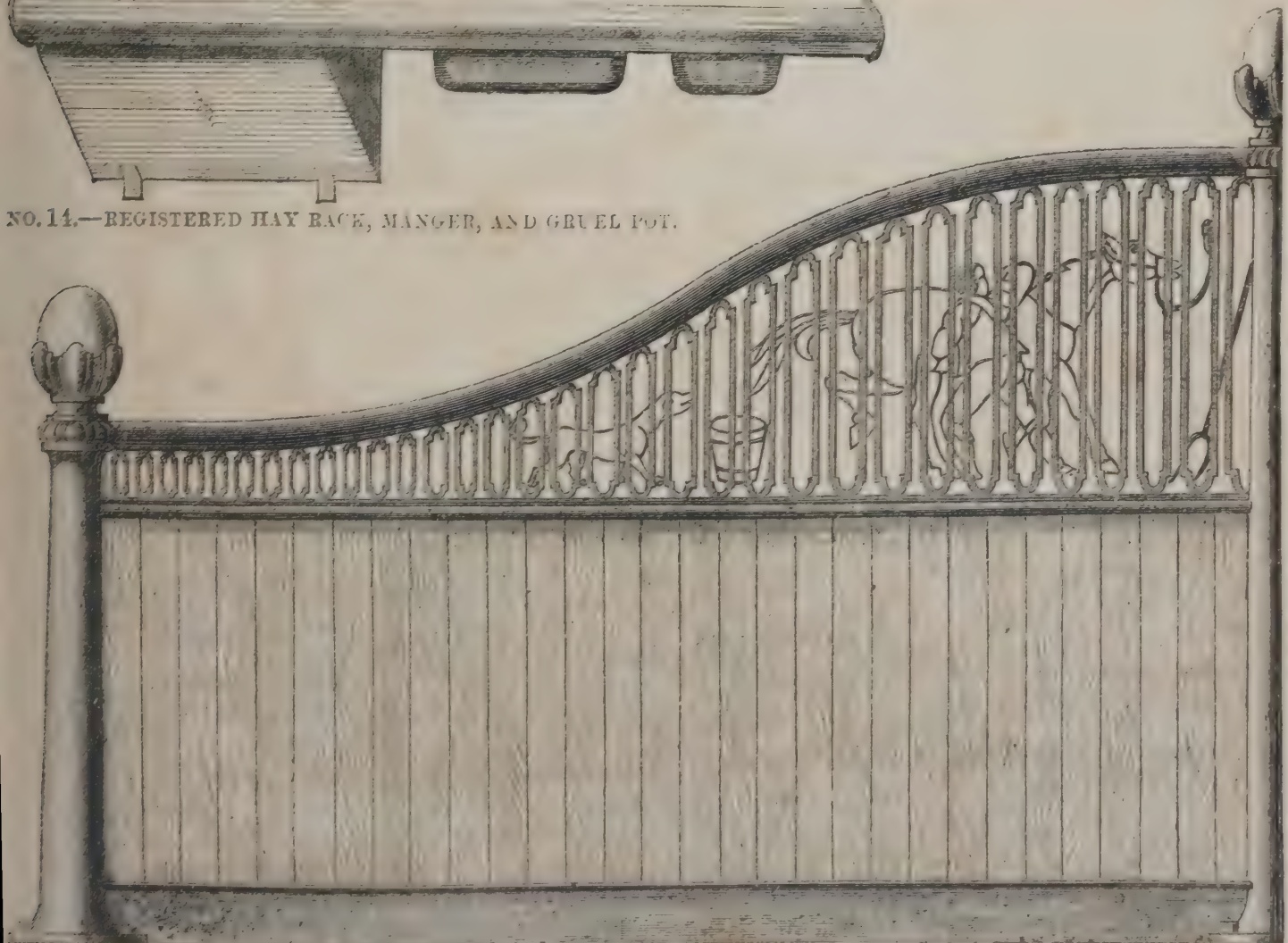


NO. 14.—REGISTERED HAY RACK, MANGER, AND GRUEL POT.

Model of improved stable fittings; comprising a flat floor, combined with efficient drainage, and with provision for dry deodorising. The hay rack is fitted with a box to catch and save the seed. The manger is fitted with a half-cover, which permits the corn to fall to the front only as the horse requires it. The front of the manger is well rounded over to prevent injury to the horse.

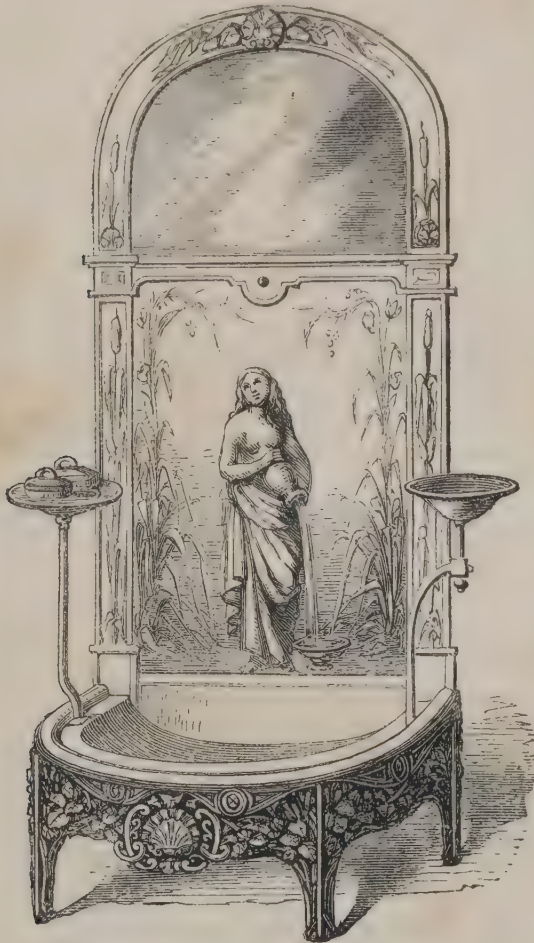
Fittings of this design were selected by the late Prince Consort for Holyrood stables, and received the first prize at the Highland Society's show.

Seed-box and wood of stall not supplied.



NO. 5.—ORNAMENTAL STALL DIVISION.

SMITH, GEORGE, & Co., *continued.*



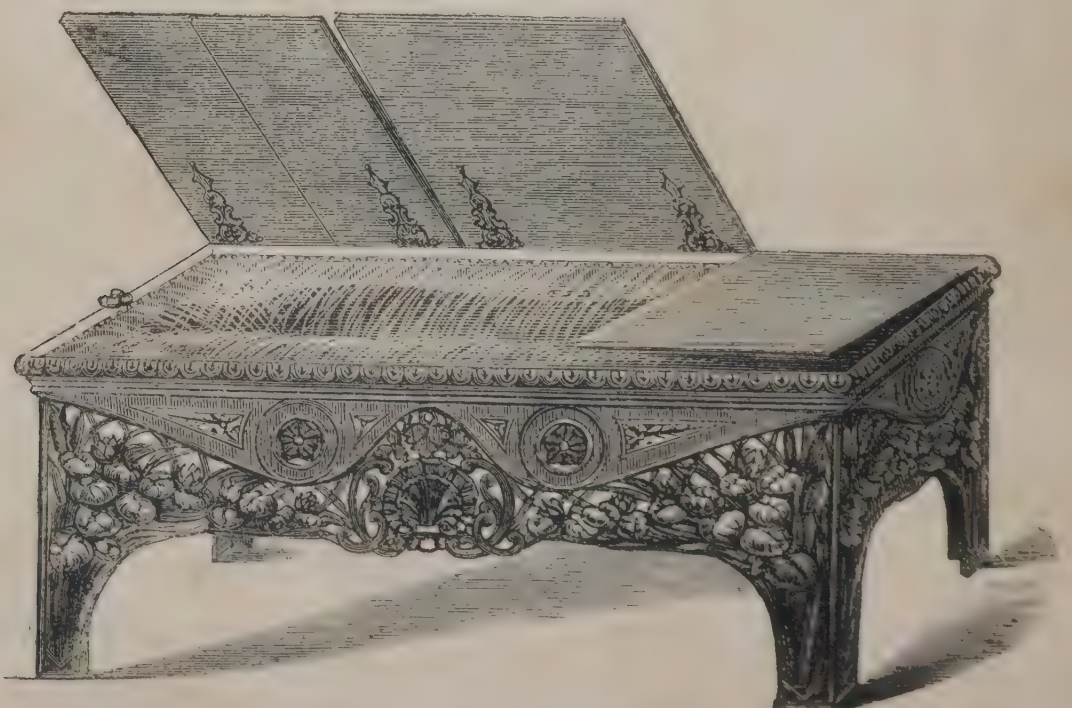
PATENT LAVATORY.

PATENT LAVATORY, in the bed-room or dressing-room, combines in one the various appliances required for ablutionary purposes. The stand itself is converted into a foot, sponge, or sitz bath, and the basin is fixed to a hollow swivelling pillar. The framework is filled in with ornamental glass, and is used as a mirror; and when used as a sponge bath, a curtain prevents injury to the walls and furniture.

THE PATENT LAVATORY is also made without the glass screen, and in this form is admirably adapted for use in large establishments, such as barracks, hospitals, schools, &c. &c. These articles are supplied without the glass or porcelain basins, and may be made portable, if required.

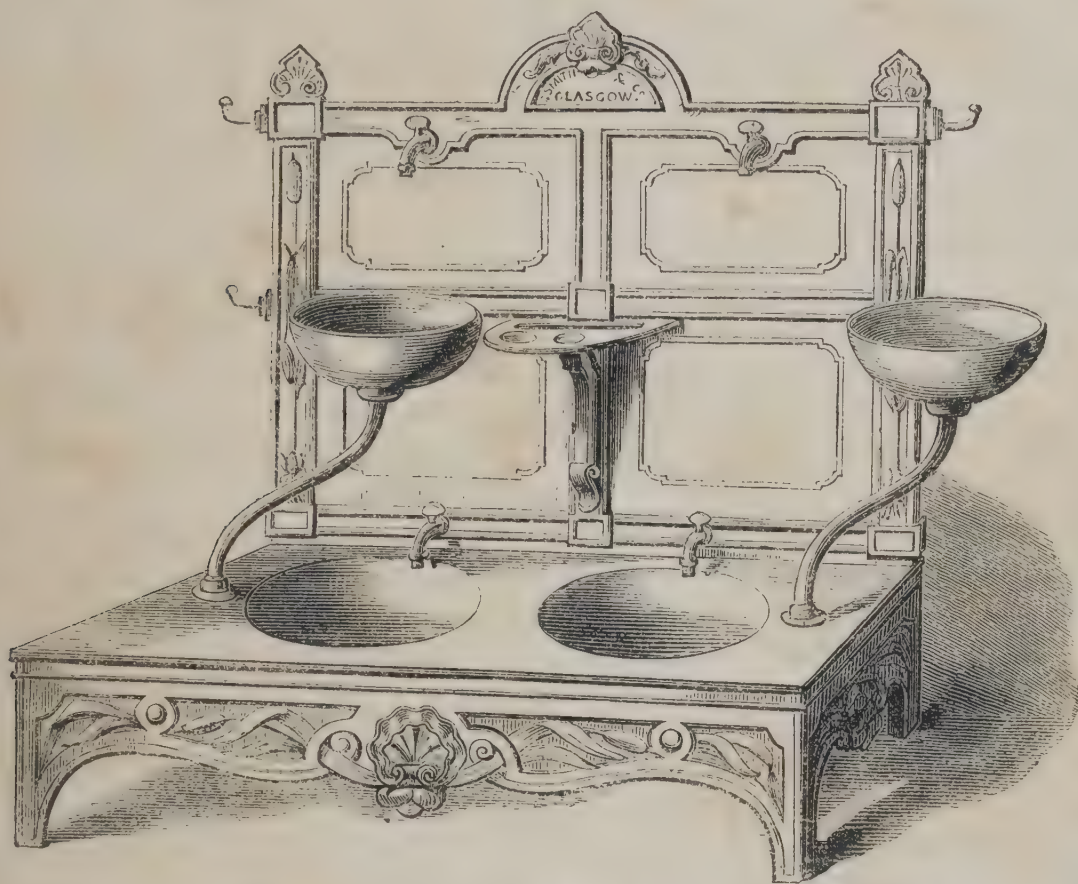
PATENT EGYPTIAN BATH; shaped to give comfort to the user, and to economise water; and having provision for raising and maintaining the temperature, for giving a vapour bath, and for supplying hot or cold showers in a novel and extremely refreshing manner.

The bath is self-contained and portable, and the folding cover appears, in the bed-chamber or dressing-room, as an ornamental article of furniture. The bath may be had without the ornamental frame, or interior fittings.

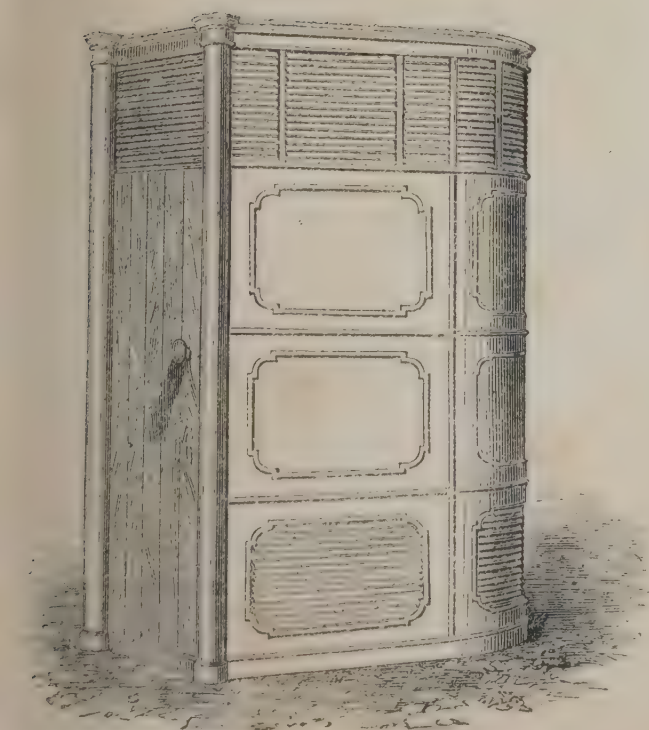


PATENT EGYPTIAN BATH.

MITH, GEORGE, & Co., *continued.*



PATENT LAVATORY, ADAPTED FOR USE AS A WASH-HAND AND FOOT RANGE.



PATENT DRY DEODORISING COMMODE, IN IRON STRUCTURES, WITH VENTILATING VENETIAN PANELS, AND CAN BE SUPPLIED IN RANGES.



PATENT DRY DEODORISING COMMODE FOR THE BED-CHAMBER CLOSET.

The shell or frame is of cast iron and painted imitation wood; the working details are of the simplest construction, and do not get out of order. It is the most satisfactory appliance yet introduced

for working out the system of dry deodorisation a system recommended by the best authorities, and which must gradually work its way to general adoption.

[2402]

SOWOOD, THOMAS, *Blue Boar Court, Manchester*.—Models of apparatus for curing smoke chimneys, ventilation, and heating buildings.

[2403]

SPENCER, THOMAS, 32 *Euston Square*.—Filters for purifying water with a new compound magnetic iron oxide.

THE MAGNETIC PURIFYING FILTER is the only one known to science that effects a chemical purification of water. Several other fluids are also purified by its agency, as shown in the specimens exhibited. Already some of our greatest scientific authorities have pronounced that, "with the Magnetic Filter, impure water is impossible."

No matter how chemically impure or offensive water may originally be, in passing through these Filters it becomes as pure and sparkling as the purest spring water. The change is effected on principles precisely analogous to those exercised by Nature, in converting impure surface water into the refreshing crystalline water we find trickling from a natural spring. The most impure and highly coloured bog or drain water, or even sewer water (see the specimens), is instantaneously rendered by these filters pure, colourless, and tasteless.

In the limited space at command, it is impossible to describe adequately the philosophical principles brought into practice by this discovery of Mr. Spencer.

We may convey some idea by stating, first, that this gentleman has discovered magnetic oxide of iron—load-

stone in fact—to be Nature's chief agent of purification and that every rock or substratification that contains iron, also contains a small per centage of this most important oxide. Moreover, that where it most abounds there the water is the purest. In the Malvern district, for example, the rocks contain from ten to fifteen per cent. of this oxide; and it is scarcely necessary to add that its waters are the purest in England. Mr. Spencer has also expounded the principles by which this purifying power is governed, viz., magnetic oxide attracts atmospheric oxygen to its surface; when there, the molecules of this gas become polarised, and are thus resolved into ozone—which important body is polarised oxygen.

When formed, ozone attracts the carbon of moist organic matter with avidity, and by combining with it, carbonic acid is formed. Consequently, the deleterious organic matter, and mephitic gases existing in impure water are decomposed and converted by means of the magnetic oxide into healthful and refreshing carbonic acid. Perhaps the greatest practical feature of this invention, is the mode by which Mr. Spencer converts ordinary iron into this now most important oxide.

[2404]

TAYLOR, J. J., 52 *Spring Gardens, Manchester*.—Portable gas apparatus.

[2405]

TAYLOR, JOHN, JUN., 53 *Parliament Street*.—Patent facing blocks, damp proof course, roofing, &c. (See page 53.)

[2406]

TENWICK, JOHN, *Albion Foundry, Clarendon Street, Landport*.—Patent ventilators for sewers &c.; patent cesspools and gratings.

[2407]

TYE & ANDREW, *Brixton Road*.—Patent effluvia trap for kitchen sinks; also a means of flushing drains.

[2408]

UNDERHAY, E. G., *Crawford Passage, Clerkenwell, London, E.C.*—Underhay's patent regulator water-closets, high-pressure valves, and basin apparatus. (See page 54.)

[2409]

WARNER & SONS, JOHN, *Crescent, Cripplegate, London*.—Ship and portable water-closets, sanitary contrivances, flushing apparatus for high pressure. (See page 55.)

TAYLOR, JOHN, JUN., 53 Parliament Street.—Patent facing blocks, damp proof course, roof tiling, smoke consuming and ventilating grates, and other sanitary building appliances.

The inventor, in the course of his professional practice as an architect, has had his attention particularly directed to the following too frequent defects in house construction:—

1st. The heat in summer and the coldness in winter of a slate roof, and the want of a tiled roof that shall be as light, and laid to the same pitch as slates. 2nd. Wet penetrating brick walls, and the difficulty of preventing it except by undue thickness, or the aid of cement, paint, &c. 3rd. Damp rising up the walls from the foundations (the fruitful source of unhealthy dwellings), and the want of sufficient air beneath the floors for the prevention of dry rot, &c. He has been enabled to invent and successfully bring into use the following:—

TAYLOR'S PATENT TILING FOR ROOFS.—Slate is generally applicable for roofing, as it admits of being laid to a flat pitch and is light, but is so absorbent of heat that rooms in the roof become unbearable.

Plain tiling has not this objection, but must be laid to a steeper pitch, is much heavier, being nearly of double thickness, and requiring greater strength of timber.

Pan-tiling is lighter, but so pervious to weather, as to be only suitable for sheds and similar buildings.

TAYLOR'S PATENT FACING BLOCKS.—The defects of ordinary brickwork are—

1st. It absorbs moisture into its entire substance.

2nd. The through-joints admit wet into the interior.

3rd. A wall one-brick thick, although strong enough, is not stiff enough, there being no vertical bond.

4th. No one-brick wall can be fair inside and outside.

Concrete has not been used with success in walls, as it requires to be retained as in a trench, and its external surface cannot resist the action of the weather.

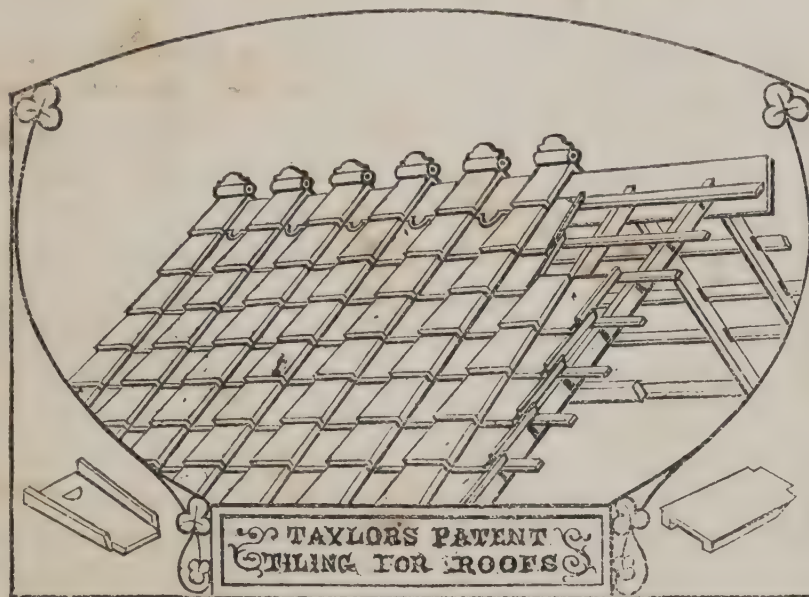
TAYLOR'S PATENT DAMP-PROOF COURSE.—In the construction of foundations, three essentials have been hitherto partially effected by as many separate means.

1st. Damp prevented rising up the walls, by a layer of asphalt, sheet-lead, slates in cement, &c.

2nd. The introduction of air by air-bricks at intervals.

3rd. Strengthening and bonding by the use of rough York stone, &c.

In the patent damp-proof course, these effects are combined.



The patent tiles may be laid to as flat a pitch as slates; their weight is 656 lbs. per square. Countess slating is 640 lbs. per square; plain tiling is 1,624 lbs. per square; pan-tiling is 840 lbs. per square. Thus it appears that it is as light as slating, and less than half the weight of the ordinary tiling. It is thoroughly rain and snow-proof, extremely pleasing in appearance, and combines all the advantages of slates and tiling without the drawbacks attending them. Price the same as plain tiling.

The patent walls have—

1st. A dry area, or space, immediately within the external face, preventing the absorption of moisture, and rendering them cool in summer and warm in winter.

2nd. All the through-joints are intercepted.

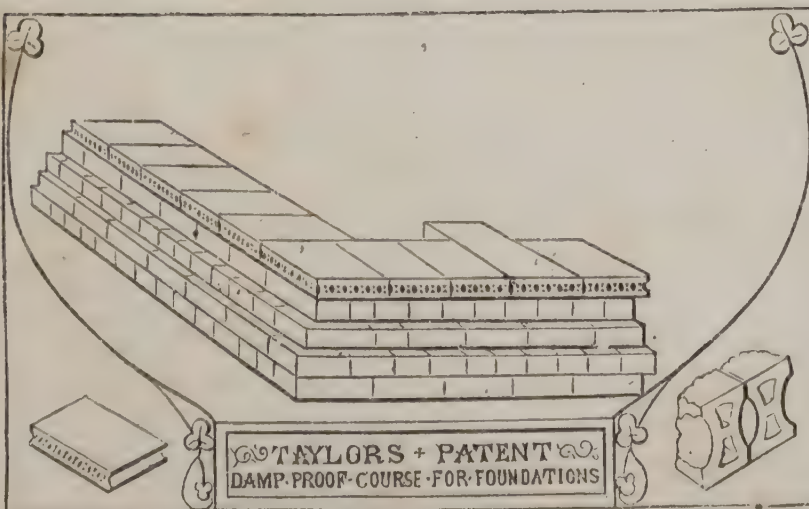
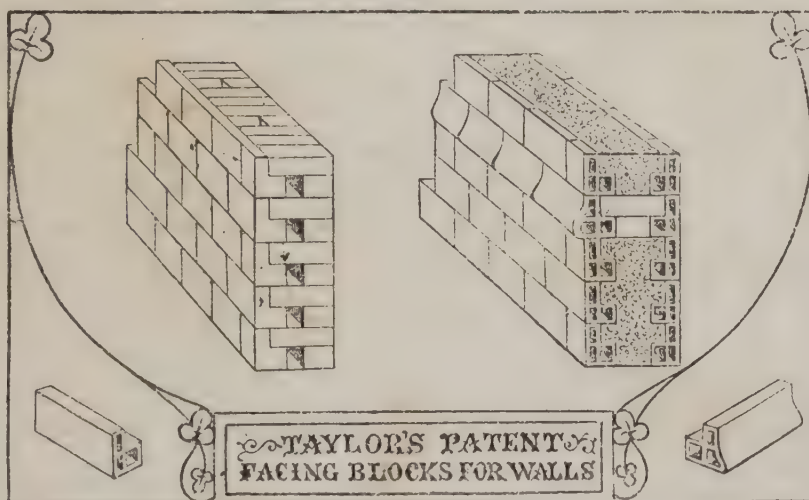
3rd. The wall is strengthened by the vertical bond effected by the facing block.

4th. The work is fair inside and outside. Concrete for walls is retained by the facing block as in a trench, which also protects it from the action of the weather.

1st. Damp rising is completely prevented, by a highly vitrified and non-absorbent material having an air space through the joints.

2nd. Air is supplied through the perforations, securing a circulation beneath the surface of the walls.

3rd. Strengthening and bonding are effected by the use of an imperishable material, capable of sustaining 600 feet of vertical brickwork upon each superficial foot. These are economically combined in the one article, with a saving of one course of brickwork in height in the building.



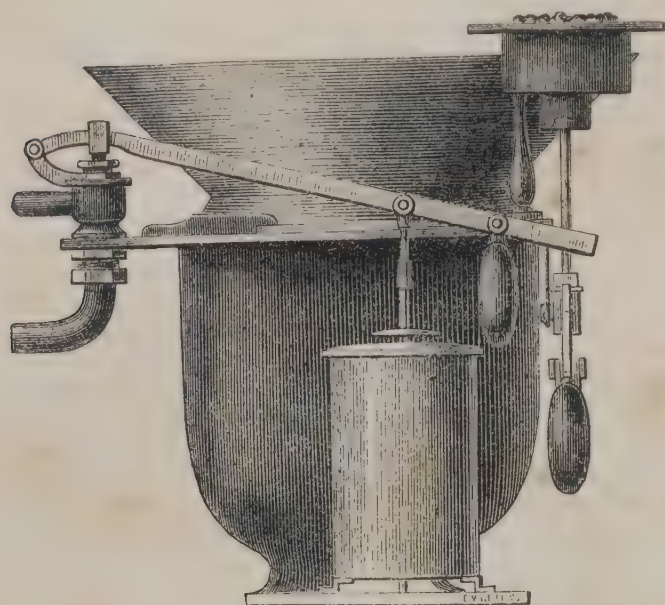
Constructed specimens of each of the above can be seen in the Court of the Eastern Annex, Class IX.

These inventions are now being extensively used in churches for the Ecclesiastical Commissioners, the Herbert Hospital now erecting for the War Office, and barrack huts at Hounslow, Colchester, &c.; also farm buildings and labourer's cottages for the Crown, and in a vast variety of villas and other buildings.

For all further information, supply, &c., apply to the offices, No. 53 Parliament Street, W.

CLASS X.—Civil Engineering, Architectural, and Building Contrivances.

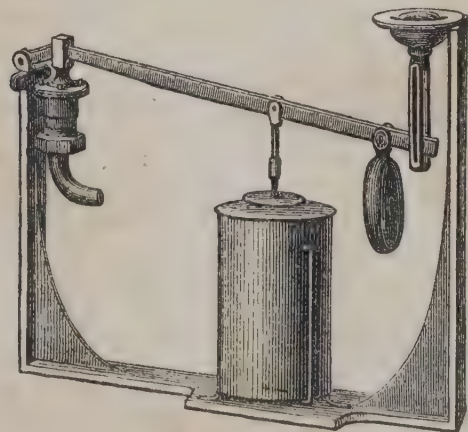
UNDERHAY, F. G., *Crawford Passage, Clerkenwell, London, E. C.*—Underhay's patent regulator water-closets, high-pressure valves, and basin apparatus.



PATENT PAN CLOSET.

These closets (Underhay's make) are in use at the Great International Exhibition (Galleries); Horticultural Gardens, Kensington; Houses of Parliament; Windsor Castle; Crystal Palace; Grosvenor Hotel, Pimlico, &c. &c.

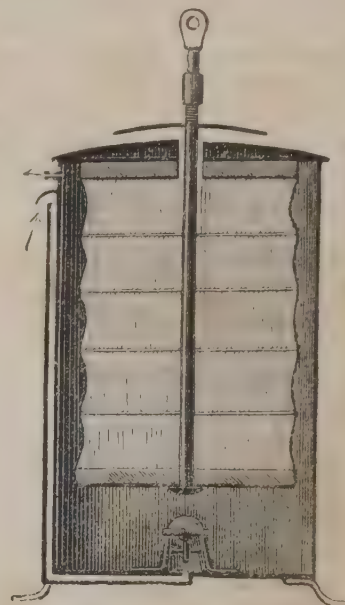
- | | | | |
|--|----|----|---|
| 1. Regulator pan closet, complete, as above | £2 | 10 | 6 |
| Ditto, best quality | 2 | 13 | 6 |
| 2. Regulator valve closet, with flat plate and white basin | 3 | 10 | 0 |
| Ditto, best quality | 4 | 4 | 0 |
| Extra for sunk dish | 0 | 4 | 6 |
| Ditto, fancy basin | 0 | 4 | 6 |



4. Underhay's patent lever valve and regulator, with sunk dish, handle, and weight. This apparatus can be used with any kind of closet, and can be had fitted complete on an iron frame, dispensing with all trouble in fixing, as it then only requires screwing to the floor (as above). Price 25s.
5. Patent lever valve, with tinned end, sunk dish, handle, rods, weight, and regulator. Price, $\frac{3}{4}$ in., 17s. 6d.
6. Ditto, with union and regulator. Price, $\frac{3}{4}$ in., 19s. N.B. Nos. 5 and 6, fitted on iron frame, 6s. extra.
7. Patent lever self-closing valve, with sunk dish, handle, and weight, for supplying hopper basin. Can be screwed to back wood-work. Price, tinned end, $\frac{3}{4}$ in., 7s. 6d.

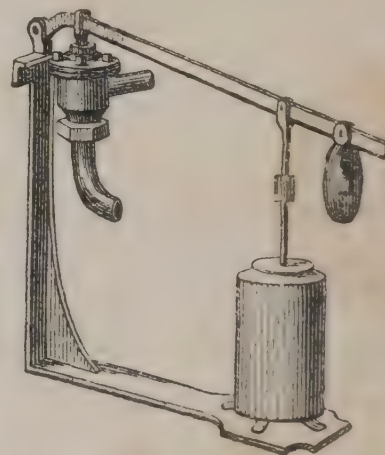
11. Underhay's patent equilibrium ball valve for very high pressures.

This valve will work equally well under high or low pressures, requiring but a small ball and comparatively short rod. The water continues to run full on till the cistern is nearly full.



PATENT REGULATOR.

3. The patent regulator consists of a cylindrical metal vessel, with an internal diaphragm of prepared leather, and valve at the bottom. On lifting the diaphragm the regulator becomes charged with air through side tube, and on depressing it the air is expelled through the small orifice above side tube, by the size of which the time elapsing in emptying the regulator is determined. Price 10s. 6d.



8. Iron frame, fitted with Underhay's patent regulator, $\frac{3}{4}$ supply valve, and union, which can be attached to old closets (as above). Price £1.
9. Underhay's patent apparatus for washhand basin, fitted with engraved ivory knobs for cold and waste water . . . £1 15 0
- Ditto, with regulator . . . 2 5 0
- Ditto, fitted for hot, cold, and waste water . . . 2 12 6
- Ditto, with two regulators . . . 3 12 6

The above prices are exclusive of basins.

10. Underhay's patent self-closing valves (flush with basin when fixed) . . . 0 3 9

12. Improved extra strong round-way screw-down bib and stop cocks; these cocks cannot leak between the spindles and cap, are very durable, easily re-washed, and specially calculated for high service and constant pressure.

CLASS X.—*South - West Court.*

WARNER & SONS, JOHN, *Crescent, Cripplegate, London.*—Ship and portable water-closets, sanitary contrivances, flushing apparatus for high pressure.

Obtained a Prize Medal in 1851.

JOHN WARNER & SONS, bell and brass founders to Her Majesty, hydraulic engineers, and manufacturers of fire engines, ships' pumps, patent brass and iron pumps, garden engines, lamps, urns, brazery goods, plumbers' work, water-closets, steam and gas cocks, lead, tin, and copper pipe, imperial standard weights and measures.

No. 148½.—Warner's patent pan closet, with regulating valve for high or low pressure. Any number of these closets can be fixed to one cistern.

No. 145½.—Warner's spring valve closet, on cast-iron frame, with vulcanised india-rubber valve and patent

supply valve attached. Any number of these closets can be attached to one cistern.

No. 68.—Warner's brass lift and force pump for house purposes.

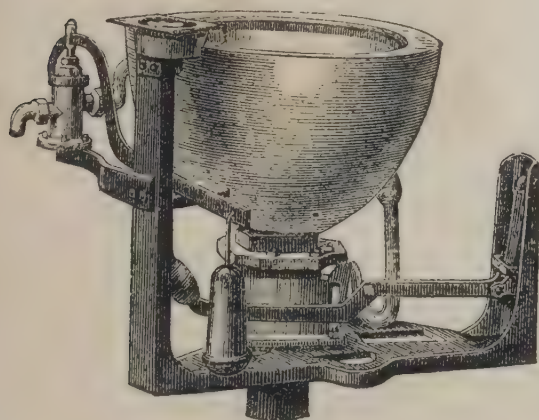
No. 383 and No. 384.—Warner's screw-down stop and bib cocks for high pressure.

No. 298.—Round shank bib cock.

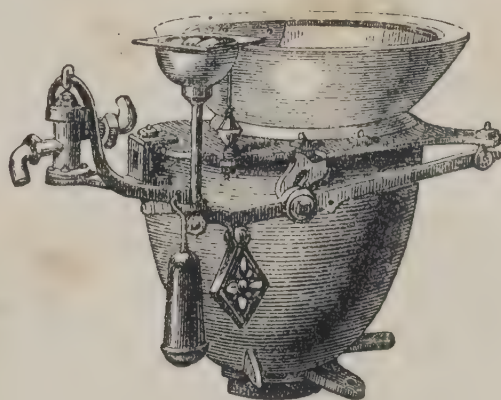
No. 287.—Stop cock.

Closets and cocks in great variety.

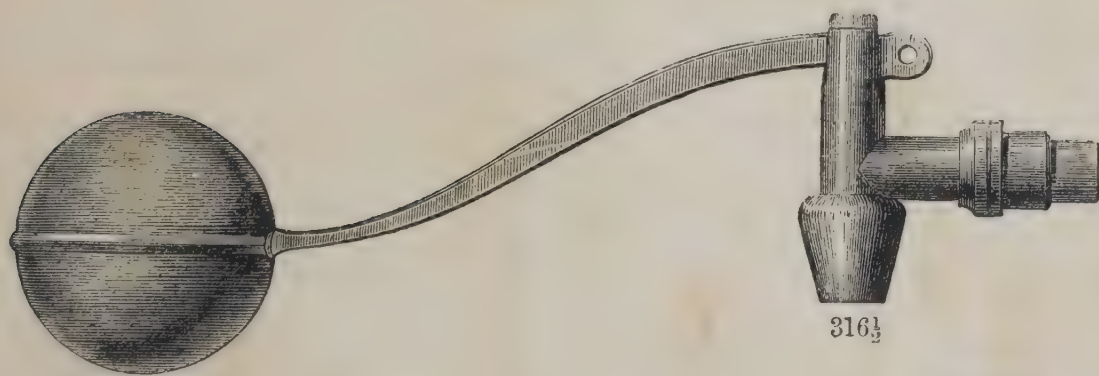
No. 316½.—Patent equilibrium ball valve, with copper ball and rod, for the supply of cisterns at high or low pressure.



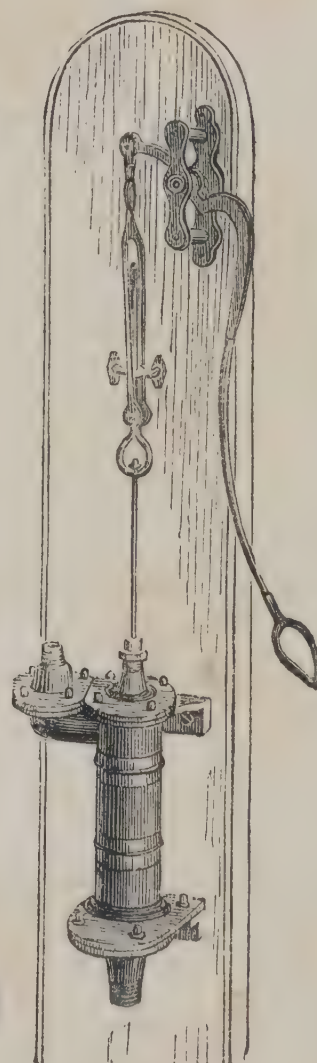
145½



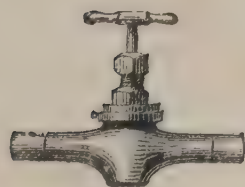
148½



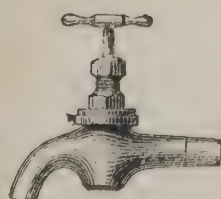
316½



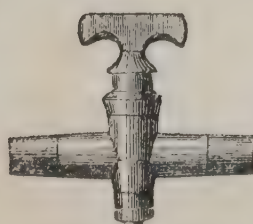
68



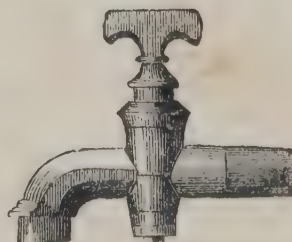
384



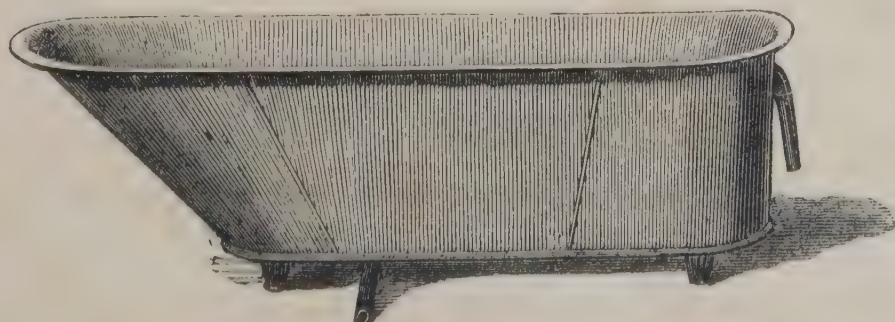
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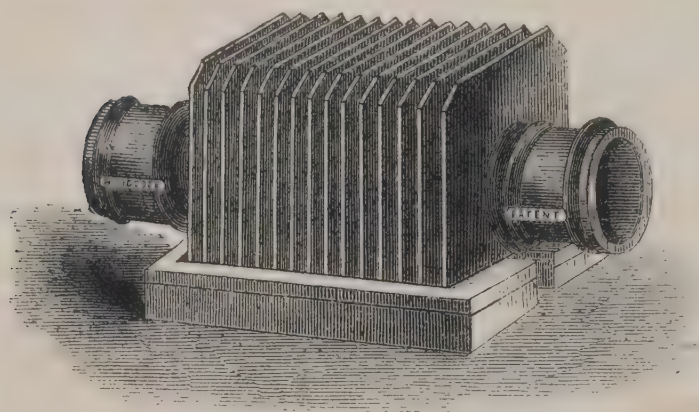
298



521

IMPROVED SHAPE ALBERT PATTERN ENAMELLED WHITE MARBLE BATH.

WOODCOCK, W., 26 *Great George Street, Westminster.*—Close stoves, open fire-places.

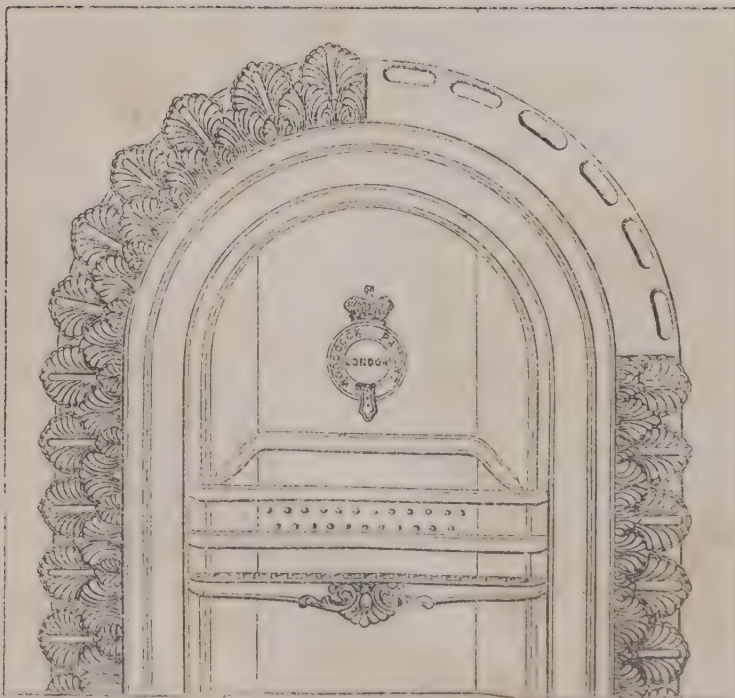
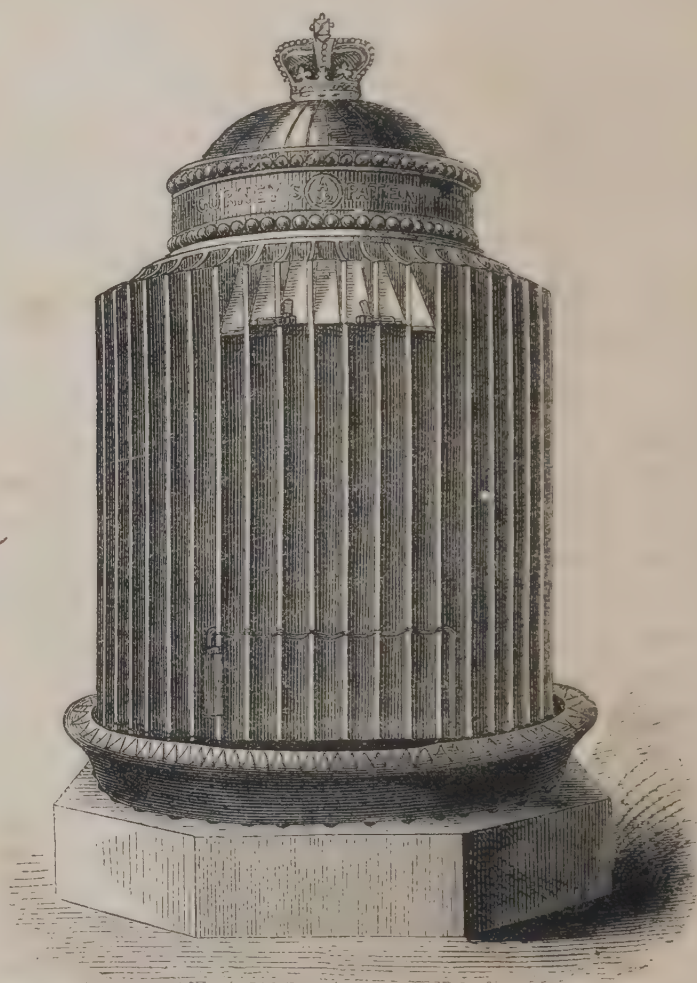


Hot Water Battery, for greenhouses, halls, &c. Advantages :—The condensing into a space of 14×15 inches the power of 25 feet of 4-inch pipe, inducing circulation of the air, and the ability to produce at will a perfectly dry, partially damp, or saturated atmosphere.

Price £2 5 0 each.

“The Gurney Stove,” used in the Houses of Parliament, the Department of Science and Art, in numerous cathedrals, including St. Paul’s and York Minster, and in many hundreds of churches, public buildings, and private houses.

	£	s.	d.		Capable of warming	
D	9	0	0	...	15,000 cubic ft. of air.	} Or double the quan- tity if in daily use.
C	16	0	0	...	30,000	
B	26	10	0	...	70,000	
A	35	0	0	...	120,000	



Ventilating Fresh Air Grate—Is set in a chamber, to which fresh air is admitted direct from the outer source, and warmed before passing through the front openings of the grate into the room. It is to a great extent a smoke consumer, *prevents all draughts from doors and windows*, and consumes about half the usual quantity of coal. By means of open spandrils, or otherwise, this stove can readily be adapted to any front required.

Price, from £2 2 0 upwards,

[2410]

WEST HARTLEPOOL HARBOUR COMPANY, *West Hartlepool*.—Model of harbour, docks, &c.

[2411]

WOODCOCK, W., 26 *George Street, Westminster*.—Close stoves, open fire-places. (*See page 56.*)

[2412]

WOODWARD, JAMES, *Swadlincote, Burton-on-Trent*.—Terra cotta chimney-tops, glazed sewerage-pipes, garden-edgings, &c.



SUB-CLASS C.—*Objects shown for Architectural Beauty.*

[2423]

BLANCHARD, MARK HENRY, 74 *Blackfriars Road, London*.—Patent articles in terra cotta.

1. Portion of a flight of patent terra cotta fireproof stairs, possessing great advantages over the ordinary stone stairs, in being fireproof, more durable, stronger, and, even with all the additional decorating, cheaper than stone.

The capability of this material for decoration of the most elaborate character is well exemplified in the grand staircase of the Turkish Baths, Victoria Street, Westminster.

2. A variety of useful articles and ornamental work, including tracery for window heads.

These will be found very economical, as regards price and durability, when compared with stone work.

The exhibitor desires to call particular attention to his patent reversible tessellated pavement, which is unsurpassed in elegance, cheapness, and durability.

He also directs the notice of contractors and others to his patent mile, distance, fencing, and telegraph posts, which are imperishable in any soil or climate.

Those who adopt them will find them to effect a great saving in time, labour, and cost, and to possess great advantages over wood.

[2424]

BOUCNEAU, A., 48 *Warren Street*.—Three statuary French and Italian marble chimney pieces : style, Louis Quatorze ; Louis Seize ; Italien.

[2425]

THE COUNCIL OF THE ARCHITECTURAL MUSEUM, 18 *Stratford Place, W.*.—Architectural and decorative carvings in stone and wood.

[2426]

CLAY, C., 21 *Sidmouth Street, Regent Square*.—Inlaid marble table.

[2427]

EARP, THOS., 1 *Kennington Road, Lambeth*.—Marble, alabaster, and stone reredos ; stone drinking-fountain ; alabaster chimney-piece ; oak lectern.

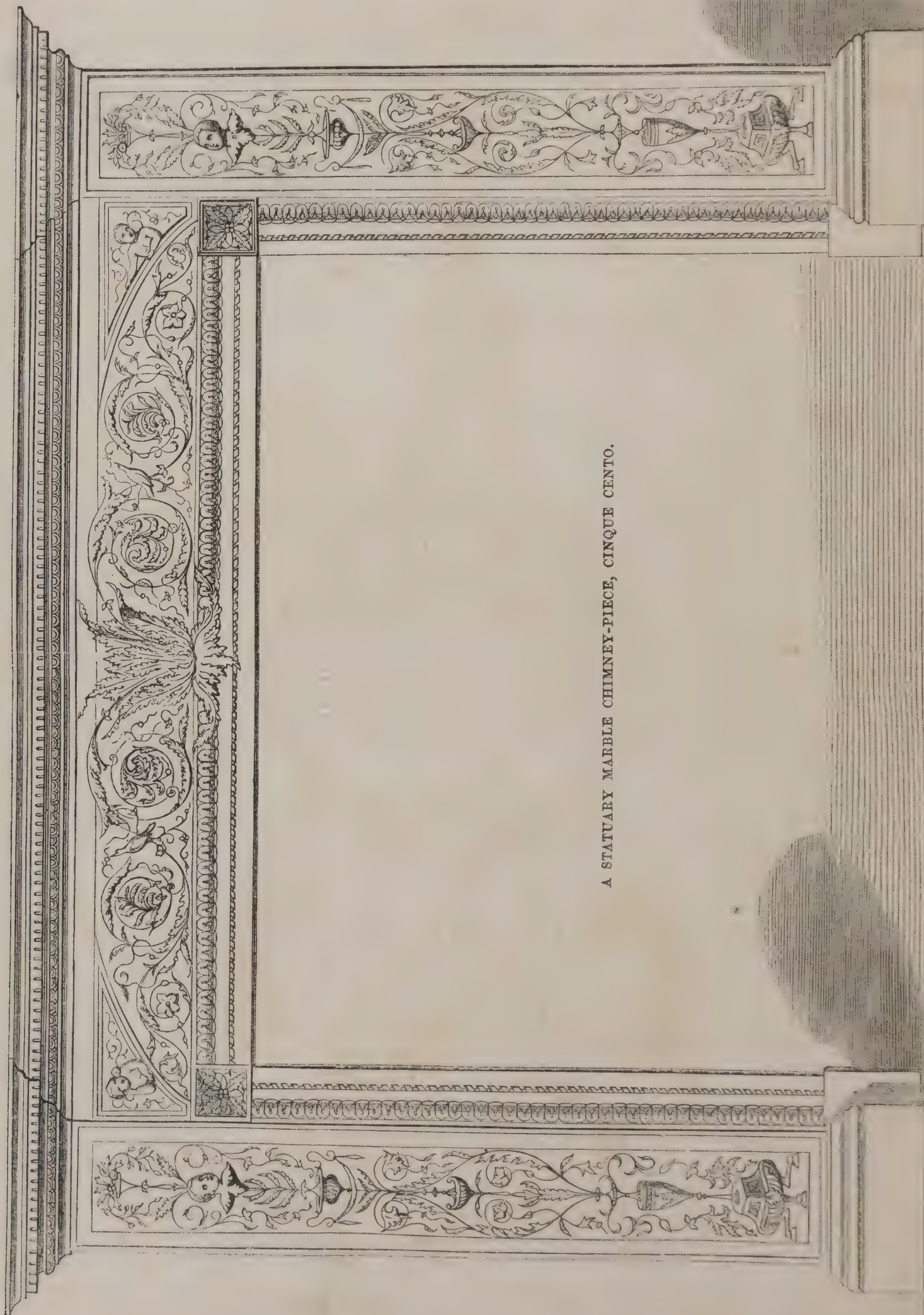
[2428]

EDWARDES, BROS., & BURKE, 142 and 144 *Regent Street*.—Three sculptured statuary chimney-pieces ; mediæval monument. (*See page 58.*)

[2429]

FIELD, W. B., *Parliament Street*.—A marble column.

EDWARDES, BROS., & BURKE, 142 and 144 Regent Street ; and 29, 30, and 31 Warwick Street, 17 Newman Street, Oxford Street ; Carrara, Brussels, and Invernettie, N.B.—Three sculptured statuary chimney-pieces ; mediæval monument.



A STATUARY MARBLE CHIMNEY-PIECE, CINQUE CENTO.

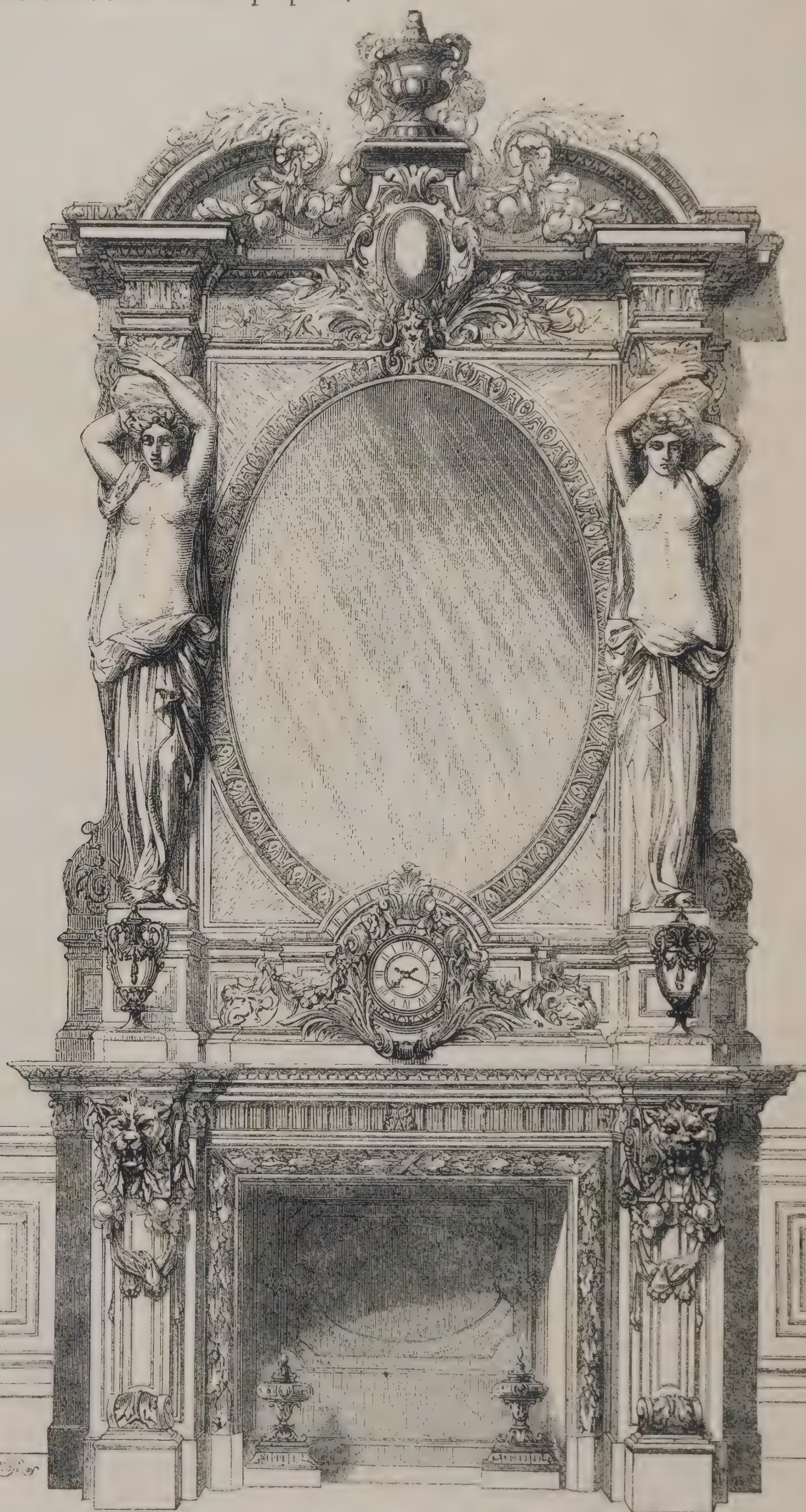
[2430]

FORSYTH, JAMES, 8 *Edward Street, Hampstead Road, London.*—Working model of statuary marble font, with carved oak cover. Executed for the Earl of Dudley, and fixed in Witley Church. Designed by Mr. S. W. DANKES, Architect. Richly carved oak bench ends for choir of Chichester Cathedral. Designed by Mr. WILLIAM SLATER, Architect.



MODEL OF MARBLE FONT IN WITLEY CHURCH.

JACKSON & SONS, GEORGE, 49 Rathbone Place, Oxford Street.—Specimens of *carton pierre* enrichments for architectural purposes,



Chimney-piece executed in *carton pierre*. The peculiar advantage of this mode of execution over wood is, that the material is not liable to shrink through heat. Greek candelabrum, executed under the direction of C. R. Cockerell, Esq., R.A; griffins, with candelabrum

between; Louis XVI. door and over-door; various mouldings; ovals; centre flowers for ceilings; room cornices; compartment of ceiling, &c., showing the advantages of the material for lightness, sharpness of detail, and relief.

MAGNUS, GEORGE EUGENE, 39 and 40 Upper Belgrave Place, S.W.—Enamelled slate bath, billiard-table, chimney-pieces, door-way, stoves, &c.

Obtained the Prize Medal in 1851, and two First-class Medals at the Paris Exposition, 1855. Also, Medal of the Society of Arts.

1. HALL TABLE—representing Irish green, Verona, Sienna, and Genoa green marbles; lapis lazuli circle in back, with raised shield and ciphers.

2. HOT-WATER COIL CASE.—Black, with inlaid mosaic pilasters; Verona caps and bases.

3. STAIRCASE (portion of)—representing Sienna marble, with bronzed metal stringing and balusters, serpentine newel, and hand-rail; treads, risers, and soffit in grooves, and moveable.

4. BATH.—Enamelled pale green, with porphyry casing and capping, step, and riser.

5. LARDER FITTINGS.—Enamelled pale green wall-lining, and pink granite shelves and brackets.

6 to 13. CHIMNEY-PIECES—representing various marbles, and fitted with suitable grates for dining-rooms, drawing-rooms, libraries, &c.

14. PEDESTAL AND VASE.—Porphyry, inlaid black, with ormolu mounting.

15. PEN TRAYS.—Two carved pen trays, enamelled *vert de mer*.

16. CABINET WITH SLATE TOP.—The top of Sienna, inlaid with Florentine sprig, &c. &c.

17. PILASTER.—Ground of Fior di Persico, inlaid with lapis lazuli, Sienna, and other marbles, and bird centre.

18. PEDESTAL STOVE.—Porphyry, with fire-stone interior.

19. BILLIARD TABLE.—Magnus's patent, with rich Florentine mosaic subjects inlaid in maroon panels, on Verona ground.

20. PAIR OF SLATE DOORS.—Verona, with malachite sunk panels, enriched with ormolu mountings; the centre of malachite, with Florentine subject; the architrave mouldings of serpentine; wall-lining of rich Sienna, surmounted by entablature of Irish green, with serpentine moulding, and white figures and scrolls represented in relief.

21. FOUR ALTAR TABLETS.—Enamelled black, with sunk gilt letters and illuminated capitals.

22. SLATE CIRCLE, with Florentine bird and gilt moulding.

23. ILLUMINATED CLOCK, with enamelled slate case; lapis lazuli and various marbles, with rich metal mountings.

24. ETRUSCAN VASES (*three*) for Etruscan chimney-piece.

MAGNUS'S ENAMELLED SLATE obtained the medal of the Society of Arts, the prize medal of the Great Exhibition, 1851, and two first-class medals at the Paris Exposition. It is patronised by her Majesty the Queen, by the Empress of the French, by the princes of India, has been used in the seraglio at Constantinople, and in most of the Continental palaces. It is largely employed in Government buildings, in clubs, first-class hotels and railway stations; and is recommended and extensively used by our best architects in the mansions of the nobility and gentry. It is also adapted to houses of less pretensions, being handsomer, more durable, and not nearly half the cost of marble.

ARTICLES MADE:—

Chimney-pieces.

Cabinet stoves.

Baths and fountains.

Console slabs and brackets.

Hall tables.

Sideboards.

Hot water coil cases.

Columns and pilasters.

Vases.

Pedestals for statues and busts.

Altar tablets.

Clock dials.

Chess and other table tops.

Washstand and dressing table tops.

Wall linings.

Door-plates and handles.

Dairy and larder fittings, including wall lining to ditto.

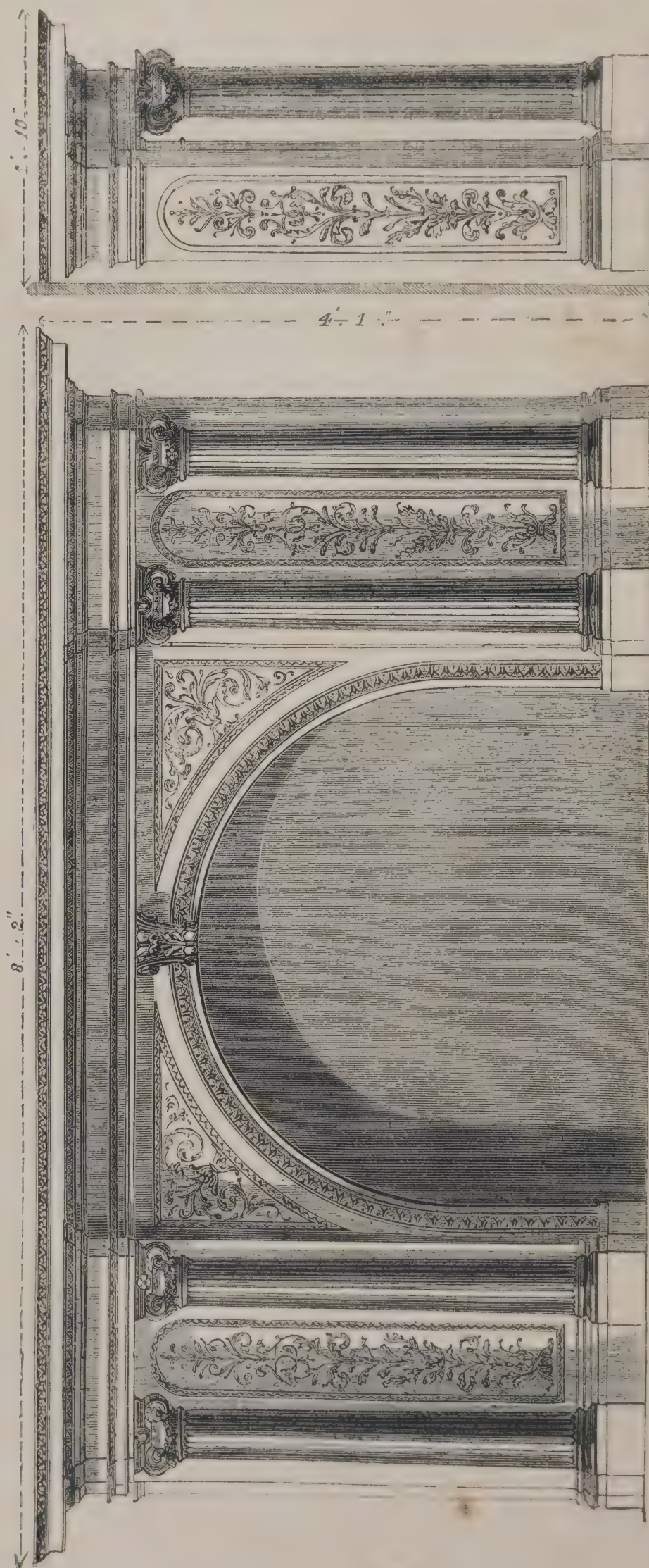
Billiard tables, &c. &c. &c.

Inferior imitations of these beautiful productions are now being made. Architects are requested, in order to protect the public, themselves, and the inventor, to observe that the name of "MAGNUS" is on the under side of each piece.

Plain slate works of all descriptions in a very superior style, and at low charges.

Shippers and merchants will find MAGNUS'S Enamelled Slate more suitable for export than marble. Its great strength, ten times that of vein marble and statuary, renders it safe from breakage. For the frames and legs of billiard tables it is the only material that will withstand the effects of climate. (See Reports of the Juries of the Great Exhibition, p. 571.)

MITCHELL, J., *Walton Street, Brompton.*—A marble chimney-piece.



IN PURE STATUARY MARBLE, PRICE TWO HUNDRED GUINEAS.

GEORGE MITCHELL has a large selection of well-designed marble chimney-pieces and monuments, always ready for fixing and exportation.} He undertakes to restore and to keep in repair marble and stone work, and will send directions for cleaning and restoring. An illustrated book and a priced catalogue will be sent post free on application.

[2431]

GEORGI, GUSTAVO, 18 *Homer Street, Lambeth*.—Scagliola imitation of Florentine mosaics; ornamental models for marble chimney-pieces, ceilings, &c.

[2432]

GOMM, HENRY J., 18 *Royal Street, Lambeth*.—Portion of a Caen stone chimney-piece, illustrating the "Cock and Jewel."

[2433]

HARMER, J. M., 10 *Thornhill Bridge Place, Caledonian Road*.—Models of architectural ornaments.

[2434]

JACKSON & SONS, GEORGE, 49 *Rathbone Place, Oxford Street*.—Specimens of *carton pierre* enrichments for architectural purposes. (*See page 60.*)

[2435]

MAGNUS, GEORGE EUGENE, 39 and 40 *Upper Belgrave Place, S.W.*—Enamelled slate bath, billiard-table, chimney-pieces, door-way, stoves, &c. (*See page 61.*)

[2436]

MITCHELL, J., *Walton Street, Brompton*.—A marble chimney-piece. (*See page 62.*)

[2437]

NESFIELD, W. E., *Bedford Row, W.C.*—A drinking fountain, mediæval style.

[2438]

PALMER, JOHN EARLE, *Guildhall, Swansea*.—Model of a font, in Maltese stone.

[2439]

PALMER, J. E., *Swansea*.—Model of a font.

[2440]

POOLE, HENRY & SON, 11 *Great Smith Street, Westminster*.—Marble mosaic pavement; incised and inlaid surface decoration in alabaster and stone.

Marble mosaic pavement, manufactured for the choir of Chichester Cathedral, from the designs of Mr. William Slater, architect. The portion exhibited comprises the richest part of the pavement. The central compartment will be placed immediately in front of the communion table. The entire work is composed of different kinds of marble, English and foreign. The design of the central portion shows a combination of conventional floreated ornament, with geometrical patterns. The floreated border is composed of Verde di Prata, Griotte, &c. The central cross, with the circle around it, is also much enriched with floreated ornaments in Italian, English, and Irish marbles. A considerable portion of the pavement is composed of rich geometrical patterns, so arranged as to give varied alternations of colour.

Doorway in Steetley Stone, designed by Mr. William Slater, architect, is to form the entrance to a mortuary chapel, now being built at Sherborne, for G. D. W. Digby, Esq.

The following marbles are employed in the shafts:—Red Devonshire spar, Irish green, Italian Sienna (yellow), and Staffordshire alabaster. The carving is executed by Mr. Samuel Poole.

Specimens of surface decoration:—

Staffordshire alabaster, incised and filled in with cement.

Inlaid Staffordshire alabaster of various tints.

Inlaid English stones of various colours.

Marble Mosaic.

Inlaid marble pavements, &c. &c.

[2441]

PULHAM, JAMES, *Broxbourne*.—Architectural and garden decorations, fountains, vases, figures, flower baskets, candelabra, &c., in terra cotta.

[2442]

RICHARDSON, E., *Harewood Square, London*.—Mural monuments, &c.

[2443]

ROBERTSON & HUNTER, *Polished Granite Works, Wellington Road, Aberdeen.*—Drinking fountains of Aberdeenshire granites.

The exhibitors manufacture fountains, pedestals, | stones, and all kinds of mural and other monumental
columns, chimney-pieces, table tops, vases, curling | erections.

[2444]

SERPENTINE MARBLE COMPANY, J. C. GOODMAN, 5 *Waterloo Place, Pall Mall.*—Vases, font, and pedestals.

[2445]

STANLEY, W., *Brighton Cottages, Earl Road, Old Kent Road, Camberwell.*—Enamelled slate, stone, and marbled glass.

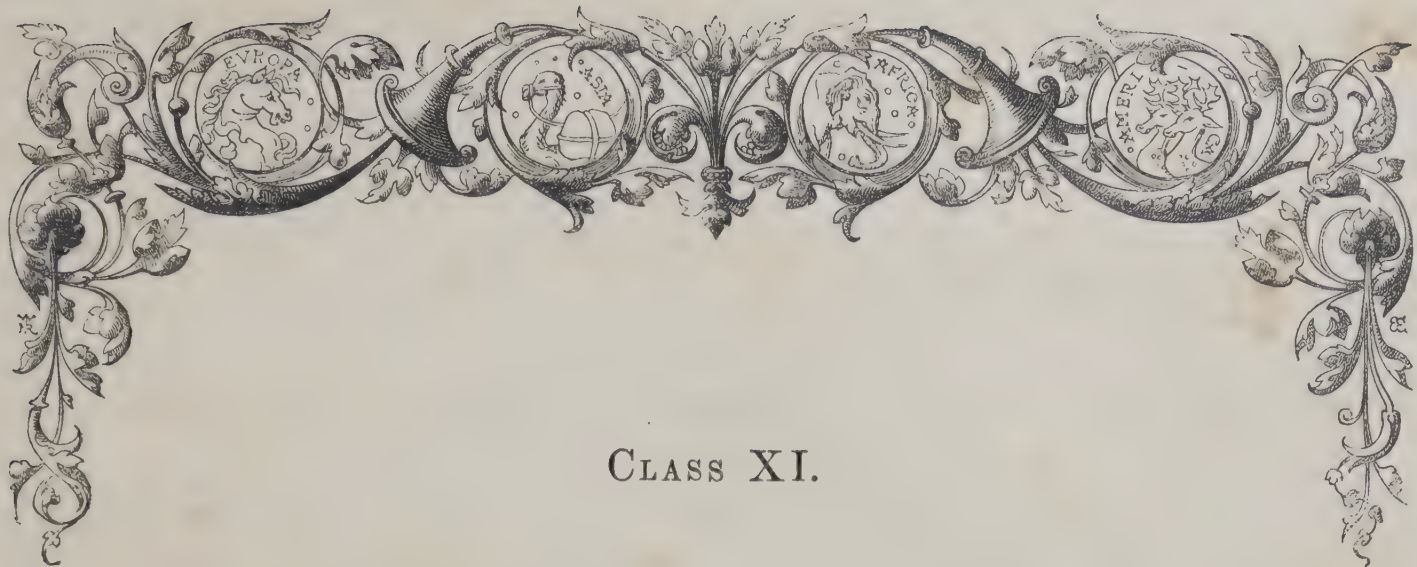
[2446]

THOMAS, J., 32 *Alpha Road, Regent's Park.*—Carved chimney-piece in statuary marble, and ornamental grate.

[2447]

WESTMINSTER MARBLE COMPANY, THE, *Earl Street, Westminster.*—A sculptured marble chimney-piece.





CLASS XI.

MILITARY ENGINEERING, ARMOUR AND ACCOUTREMENTS, ORDNANCE AND SMALL ARMS.

SUB-CLASS A.—*Clothing and Accoutrements.*

[2466]

CARTER, LIEUT.-COL., *Monmouth*.—New accoutrements and boots for the soldier, the sportsman, and the tourist.

Obtained the large silver medal of the Society of Arts in 1847, for his suspension of a knapsack.

The weight of the knapsack falls equally on both shoulders, while the chest and arms are free. By means of the straps, the gun, the fishing rod, the artist's easel, &c., can be carried on the shoulders, where they ride the lightest, without the necessity of holding them with the

hand, thus freeing the arms entirely for walking; and by means of the iron bars, being immediately under the shoulders, a considerable amount of weight can also be most conveniently carried. The basket can be increased in size, if desired, either for fish or game.

[2467]

CATTANACH, WILLIAM, *Sporran Maker Bankfoot, viâ Perth*.—Highland dress purses or "sporrans," with improvements.

[2468]

FIRMIN & SONS, 153 *Strand, London*, and 2 *Dawson Street, Dublin*.—Metal buttons and military ornaments.

[2469]

HOLMES, THOMAS, 15 *Princess Terrace, Regent's Park*, and 22 *John Street, Edgware Road*.—Improved self-acting cartouch box and military gaiter.

[2470]

MACKENZIE, CAPTAIN J. D., *R.E. Office, Devonport*.—Light volunteer knapsack.

[2471]

MITCHELL, H., 39 *Charing Cross*.—Photographs of British war medals, &c.

[2472]

MUNN, MAJOR, *Throwley, Kent*.—Cartouch-box, compact, light, and waterproof.

[2473]

TROUBRIDGE, COLONEL SIR THOMAS, BT., C.B., 8 *Queen's Gate, W.*—Volunteer or tourist valise, suspended by a metal yoke.

SUB-CLASS B.—*Tents and Camp Equipages.*

[2486]

CLARKE, WILLIAM HENRY, 3 *Vernon Place, Bloomsbury.*—Models of ambulance waggons, &c.

[2487]

COTTON, CHARLES PHILIP, 8 *Lower Pembroke Street, Dublin.*—Model of improved tent.

[2488]

EDGINGTON, BENJAMIN, *Duke Street, London Bridge.*—Military tent, with stove, and models of other tents.

Obtained a prize medal in 1851.



MODELS AND DRAWINGS OF MILITARY TENTS AND MARQUEES.—Marquees, suitable for military purposes; also for agricultural and horticultural exhibitions, dinners, public meetings, &c.



IMPROVED MILITARY OR TRAVELLING TENT.—The two porches, and the complete ventilation, are improvements of great value—it can be erected with ease by two men; while its peculiar shape offers most effectual resistance to wind and rain.

[2489]

EDGINGTON, FREDERICK, *Thomas Street, Gloucester Place, Old Kent Road, London.*—
Marquees and tents.

The exhibitor manufactures flags of all nations in silk or bunting; cricket marquees and tents; rick cloths; waggon cloths; engine and machine covers; sacks, ropes, &c.



Monster new marquees and tents may be had from the exhibitor on hire. Handsome and capacious marquees lined, floored, lighted, and tastefully decorated. For the erection of these marquees experienced workmen are sent to all parts of the kingdom.

The marquee shown in the illustration, 200 feet long by 40 feet wide, was erected at Lord Brownlow's, Great Berkhamstead, in October, 1860, upon the occasion of the Herts rifle contest.

6 feet square..
8 " " "
10 " " "
12 " " "



	£	s.	d.
...	5	0	0
...	6	10	0
..	8	10	0
...	10	10	0

The second illustration shows a square tent, of novel construction, without a pole in the centre, whereby an unbroken space is secured. This invention claims novelty as well as utility; it is light, portable, very strong, easy of erection, extremely simple, pretty, and cheap.

[2490]

EDGINGTON, JOHN, & Co., 17, *Smithfield Bars, E.C.*—Marquee; rick-cloth; temporary ball-room; three travelling tents; two garden tents.

[2491]

PICHLER, F., 162 *Great Portland Street.*—Folding and self-supporting tent.

[2492]

RHODES, MAJOR G. (S. W. SILVER & Co., 34 *Bishopsgate Street.*)—Portable waterproof tents.

[2493]

TURNER, GEO., *Northfleet, Kent.*—Improvements in the construction and fittings of tents and marquees (patented 1855).



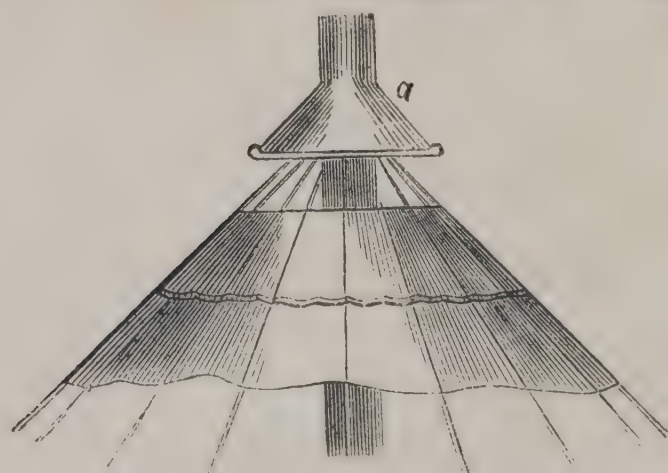
TURNER'S PATENT TENTS AND MARQUEES.—Adapted for military camps and hospitals; anglers, sportsmen, emigrants, tourists, gold diggers, &c.; also for railway and mining operations abroad.

These tents are suited to all climates; are perfectly waterproof; resist both heat and cold; are provided with every needful appliance for sleeping and cooking; are thoroughly ventilated; of great strength and stability; can be pitched and struck with ease and expedition; and stowed away compactly for transport. The chimney

forms the support to the roof, and when packed occupies less space than a pole.

The hammocks are suspended at a sufficient distance from the ground, to keep the occupant dry, and out of the influence of those night damps which act so fatally upon man.

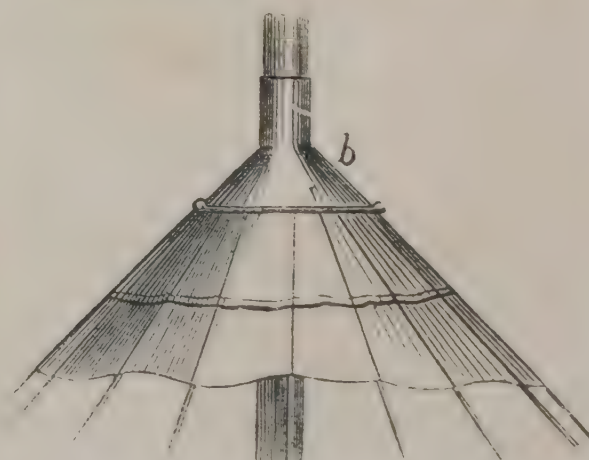
The ventilation is easily controlled by means of the sliding hood; and the screw pegs possess the greatest holding power—one weighing only 1 lb. being capable of a resistance of from 700 lbs. to 800 lbs. in ordinary turf.



(a) SHOWING THE VENTILATOR OPEN.



SCREW PEG.



(b) SHOWING THE VENTILATOR CLOSED.

For full sheets of engravings of tents and marquees for all purposes, pamphlets with particulars, reports of military officers on trials, testimonials, and prices, application should be made to the patentee, Northfleet, Kent, or McNeill & Moody, 23, Moorgate Street, London, E.C.

[2494]

UNITE, JOHN, 130 *Edgware Road, Paddington, W.*—Model of rick-cloth marquee, 30 ft. by 15 ft.; and round tent.

SUB-CLASS C.—Arms, Ordnance, &c.

[2505]

ADAIR, COLONEL SHAFTO, 7 Audley Square.—Military model of London and the adjacent country, in relief.

MILITARY MODEL OF LONDON.

Colonel ADAIR, A.D.C. to the Queen, Designer and Exhibitor.

Messrs. WILDE & Sons, New Cross, S.E., Modellers.

This model shows the defensive capabilities of London by forts, redoubts, and continuous lines, on an area of 22×14 miles.

The octagon of defence, = 50 miles 430 yards, is included within lines drawn through Woolwich, Anerley, S.E.; Kingston, S.; Twickenham, S.W.; Horsington Hill, W.; Harrow, N.W.; Hendon, N.; Stamford Hill, N.E.; East Ham, E.; measuring—

M. Yds.	M. Yds.	M. Yds.	M. Yds.	M. Yds.
S.E. 7 176	S.W. 3 264	N.W. 4 1584	N.E. 7 1232	
S. 10 528	W. 4 1056	N. 4 1232	E. 7 1408	= 50 430

Each face of this polygon represents a line of battle, of which the works at the angles give *points d'appui*, and the intermediate works supports.

The scale is of six inches to the mile, with vertical augmentation to give appreciable relief. The ground slopes outwards, at a favourable angle for manœuvre and artillery fire. Sixty-two roads permit the sorties, which an interior railway system facilitates; and streams supply means of inundation, as in the marshes of the Lea and of the Brent.

The forts and permanent works are on the German trace, as best adapted to defence by direct fire, and by sorties.

For it is assumed that the fire of breech-loading ordnance, and of volunteer infantry will supply the principal defensive power; wherefore, in order to obtain effective fire, no re-entering angle, or angle of defence, should be less than a right angle.

It is also desirable that the works should be of a simple trace, but formidable, from a wide front of fire.

The forts are adapted to prolonged resistance; the redoubts secured from insult; the lines completely swept by flanking fire; and observed, in reverse, by the permanent works.

The slopes of the country are followed, so as to give low angles of depression from ramparts secured from enfilade.

The unit of calculation for construction and armament = 600 yards.

The forts and large redoubts are constructed in brick.

The lines are in earth, with a scarp in concrete; the main ditch has a lunette, and wide ramps for sortie. Mortar batteries are constructed with parados. The lowest command = 22 feet.

The casemated batteries are recessed, so that a rolling projectile would clear in descent the angle included between the terre-plein, and the face of the casemate.

The flanks of the bridge-heads on the W. and S.W. fronts are traced on sides of a triangle, whose base coincides with the mid-stream line.

The armament is calculated on the regulated war scale, less the difference between the mean service ranges of rifled and smooth-bored guns, multiplied into the relative rapidity of fire from breech-loading and muzzle-loading ordnance. This difference, on equiva-

lent fronts, equals a deduction of $\frac{7}{16}$ from the received proportion.

All guns on ramparts are mounted on garrison carriages, in Haxo casemates, turned in concrete, and stepped in the splay.

Each casemated flank to be supplied with a turn-table, and built on a modification of the Haxo casemate, allowing the gun to traverse through 90°. Lead concrete to be used against injury from cone of blast.

The fire of casemated flanks grazes the line of defence, the ditch being swept by carronades, with a drop in front.

The re-entering angles in the bastioned lines, form *places d'armes* for sortie, under cover of the shoulder angle.

Nine points for forts on an inner line of defence are indicated on Telegraph Hill, Forest Hill, Tooting Common, the Ridgeway, in Richmond Park, near Mortlake, near Ealing, on Hanger Hill, Whembley.

Volunteer alarm-posts, stations for fire-brigades, and police picquets, are marked by red flags.

The lines having been carefully traced in advance of towns and villages, the amount of house property to be purchased is small.

100 yards are allowed in depth for works, and 300 yards additional for a military zone, on which few buildings now exist, and none could hereafter be constructed.

EXTERIOR SIDES.	LINES OF			GUNS.			
	Manœuvre.		Musketry.	Position.	Flank.	Mortars.	Carrons.
	M	Yds.	Yds.				
S.E. Anerley	*7	588	11,900	476	99	48	†98
S. Kingston.....	6	940	8,000	60	32	30	24
— — — — —	4	1360	5,900	85	16	—	16
S.W. Twickenham...	2	1430	—	151	—	—	—
W. Hanwell	3	1170	3,900	61	14	—	13
— — — — —	3	920	6,100	9	26	—	†20
N.W. Harrow.....	5	500	10,800	61	41	12	36
N. Hendon	5	500	11,900	115	30	15	18
N.E. Stamford Hill..	8	620	20,700	173	52	24	49
E. East Ham.....	8	920	10,400	131	40	—	36
For Redoubts...	—	—	—	—	—	—	40
	54	148	89,600	1322	350	129	350

* Excluding Woolwich lines. † Including Woolwich lines.
‡ Inundation of Brent.

ESTIMATE.	ACRES.	
Land—Forts ...	1,090	
— Works ...	4,935	
— Lines ...	8,896	
	14,921	£1,492,100
Works—Forts ...	£450,000	
— Works ...	893,875	
— Casem. and Mort. Bats.	67,000	
Lines—Artillery ...	249,750	
— Musketry ...	623,200	
	2,283,825	
Guns, 1,801—excluding 350 carronades	360,200	
	£4,136,125	

[2506]

ADAMS, ROBERT, 76 *King William Street, City, E.C.*—Patent breech-loading guns, rifles, and revolvers.

[2507]

AKRILL, ESAU, *Beverley, Yorkshire.*—Gilby's patent breech-loading and self-priming rifles.

Honourable mention at the Paris Exhibition, 1855.

The remaining stock of these rifles (of which specimens are exhibited), along with the sole right of manufacture, is to be sold on moderate terms; and also an entirely new breech-loading cannon, believed to be the most simple, rapid, and effective system of breech-loading for cannon yet invented. It may be seen by applying to E. Akrill, or to John Gilby, the inventor and patentee, Beverley, Yorks.

[2508]

ALLEN, JOHN WILLIAM, 22 & 31 *West Strand, London.*—Portable camp bucket, canteen, &c.

[2509]

ARMSTRONG, SIR WILLIAM GEORGE, C.B., *Newcastle-on-Tyne.*—Breech-loading and muzzle-loading ordnance, with projectiles; 2 fuses.

[2510]

BAKER, FREDERICK T., 88 *Fleet Street, E.C.*—Sporting guns and rifle.

[2511]

BAYLISS, E. & SON, *St. Mary's Square, Birmingham.*—Military implements.

[2512]

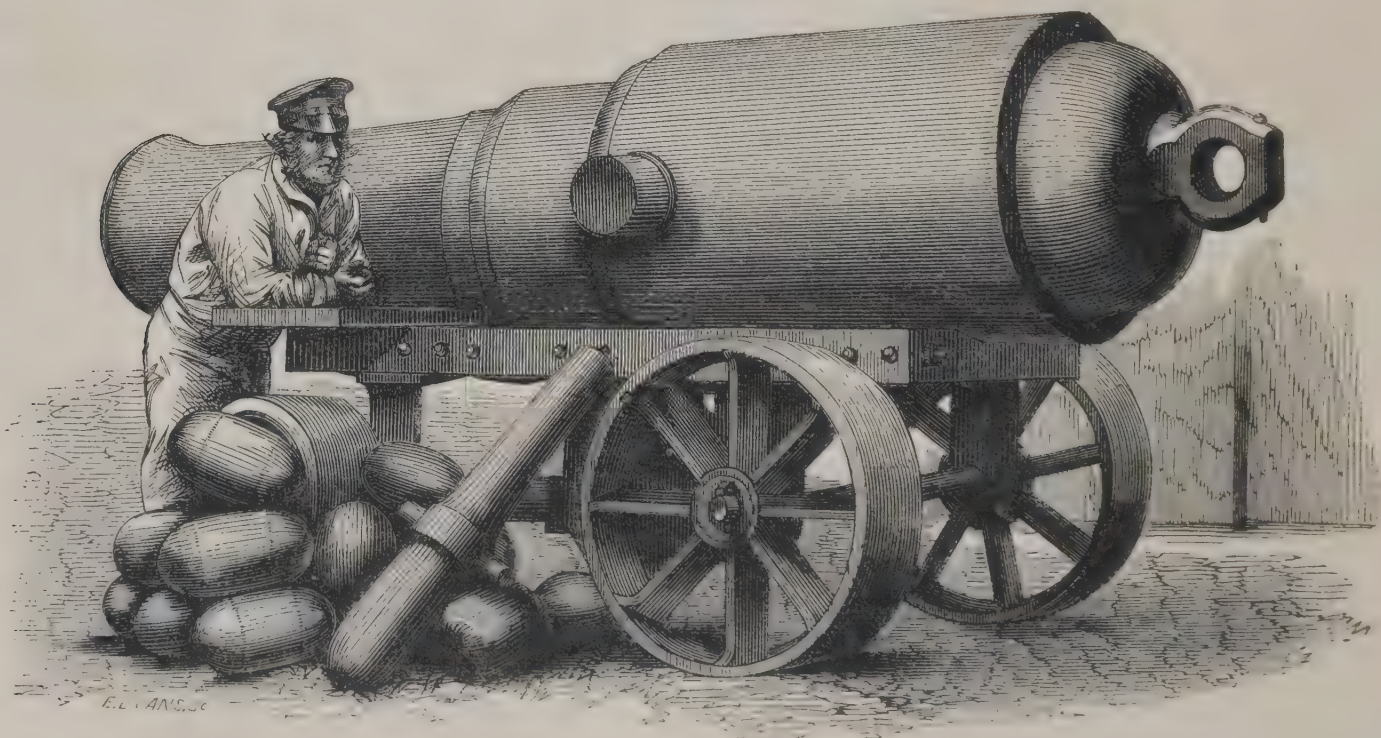
BIELEFELD, CHARLES, 21 *Wellington Street, Strand.*—Gun-wads, and cartridges.

[2513]

BIRMINGHAM SMALL ARMS TRADE, *Birmingham.*—Military rifles and guns, and pistols of various descriptions. (*See page 7.*)

[2514]

BLAKELY, T. W., 34 *Montpellier Square, London, S.W.*—Blakely's patent cannon.



BLAKELY ORDNANCE.

[2515]

BRAZIER, JOSEPH, *The Ashes, Wolverhampton.*—Sporting and military gun locks; implements; breech-loader barrels, actions, &c.

BIRMINGHAM SMALL ARMS TRADE, *Birmingham*.—Military rifles and guns, and pistols of various descriptions.

SPECIMENS OF MILITARY ARMS manufactured by the Birmingham Small Arms Trade for the English and Foreign Governments :—

1. *Small bore* ('451) rifle, with wind gauge sight.
2. *Small bore* ('451) rifle, plainer quality.
3. *Short Enfield* rifle, '577 bore, with sword bayonet.
4. *Navy* rifle, '577 bore, with sword bayonet.
5. *Enfield* rifle, '577 bore, with bayonet.
6. *American* infantry rifle, '580 bore, with bayonet.
7. *Italian* infantry rifle, '702 bore, with bayonet.
8. *Brazilian* infantry rifle, '584 bore, with bayonet.
9. *Spanish* infantry rifle, '568 bore, with bayonet.
10. *Portuguese* infantry rifle, '577 bore, with bayonet.
11. *Engineer's* rifle (Lancaster's patent), '577 bore, with sword bayonet.
12. *Sergeant's* rifle, '577 bore, with bayonet.
13. *Artillery* rifle, '577 bore, with sword bayonet.
14. *Constabulary* carbine, '656 bore, with bayonet.
15. *Cavalry* rifled carbine, '577 bore.
16. *Cavalry* rifled pistol, '577 bore, 10-inch.
17. *Cavalry* rifled pistol, '577 bore, 8-inch.

BENTLEY and PLAYFAIR, Birmingham, Manufacturers.

21. Double-barrel fowling-piece.
22. Breech-loading double-barrel fowling piece, with front action locks.
23. Erskine's patent breech-loading double-barrel fowling-piece, with eccentric action to slide barrels forward.
24. Small bore, '451 rifle, with wind gauge sight and movable shade.
25. Small bore '451 rifle, full stocked, wind gauge sight, with shade.

COOPER and GOODMAN, Birmingham, Manufacturers.

26. Cooper's patent breech-loading rifle.
27. Cooper's patent breech-loading rifle.
28. Case containing a section of Cooper's patent breech-loading rifle, and parts with cartridges for the same.

ISAAC HOLLIS and SONS, Birmingham, Manufacturers.

29. Small bore, '451 rifle, with wind gauge sight, and "Aston's" pattern rifling, warranted not to foul.
30. "Hay" pattern rifle, with 36-inch '577 bore barrel and wind gauge sight.
31. Double-barrel fowling-piece, with laminated steel barrels.
32. Double-barrel breech-loading fowling-piece.
33. Isaac Hollis and Sons' patent solid trigger-guard.
34. Isaac Hollis and Sons' improved sight shades and protectors.

KING and PHILLIPS, Birmingham, Manufacturers.

35. One rifled patent breech-loading cavalry carbine.
36. One rifle corps carbine, with patent breech-loading action.
37. One pistol hand breech-loading gun, sixteen squared barrel.

JOSEPH SMITH, Birmingham, Manufacturer.

38. Breech-loading shot gun, chain twist barrels.
39. Double gun, steel barrels.

40. Double gun, stub Damascus barrels.
41. Single rifle, '451 bore, wind gauge sight.
42. Pair of under and over pistols, and implements.
43. A set of best gun implements.
44. A set of second quality gun implements.

C. P. SWINBURN and SON, Birmingham, Manufacturers.

45. Jacob's army double rifle, with sword, sighted up to 2000 yards.
46. Bailey's patent breech-loading military rifle, with bayonet.
47. Bailey's patent breech-loading rifled carbine for cavalry.
48. Small bore rifle, with patent lock and quadrant sight.
49. Swinburn's small bore rifle, with Newton's patent sight.
50. Case containing skeleton action, showing the principle of Bailey's patent breech-loader, with all its parts.

TIPPING and LAWDEN, Birmingham, Manufacturers.

51. Breech-loading double rifle.
52. Breech-loading single rifle.
53. Muzzle-loading shot gun.
54. Patent repeating pistol, in case.
55. Patent repeating pistol, in case.
56. Patent repeating pistol, in ornamental case.
57. Patent repeating pistol, in ornamental case.
58. Dressing case, fitted with patent repeating pistol.

THOMAS TURNER, Birmingham, Manufacturer.

59. Turner's patent rifle musket, with bayonet, '452 bore.
60. Turner's patent rifle, plain, iron mounted, with concentric fore sight, with shade.
61. Turner's patent rifle, windage back sight, concentric fore sight, with shade.
62. Turner's patent rifle, best full stocked, with Turner's improved windage fore sight.
63. Turner's patent rifle, half stocked, pistol hand-octagon barrel, with Turner's improved windage fore sight.

JAMES WEBLEY, Birmingham, Manufacturer.

64. Wilson's patent breech-loading military rifle, '577 bore, with bayonet.
65. Wilson's patent breech-loading short rifle.
66. Wilson's patent breech-loading rifled cavalry carbine.

B. WOODWARD and SONS, Birmingham, Manufacturers.

67. Breech-loading double gun.
68. Best muzzle-loading double gun.

PRYSE and REDMAN, Birmingham, Manufacturers.

69. Gun barrels in different stages of manufacture.

WM. TRANTER, Birmingham, Manufacturer.

70. Tranter's patent double action revolver, gilded.
- Tranter's patent double trigger revolver, gilded.
- Tranter's patent military gun locks, made by machinery, to interchange.

[2516]

BREECH-LOADING GUN COMPANY, *Great Portland Street, London.*—Guns, rifles, rests, slings, stadiometers; military percolators (patented).

The following are exhibited, viz.:—Single and double rifles, both military and sporting, secured by “Leetch’s” and “Sturrock’s” patents. They are rifled on “Scott’s” patent cylindric principle; no special cartridge or wad is required; and they are the only breech-loaders which take the Government ammunition, with the skin, or any

other whole cartridge. Sturrock’s registered sitting rifle rests; the stadiometer, for judging distance, has been adopted by Government; King’s registered rifle slings; Herr Mott’s porous charcoal military water filters; Lefauchaux and muzzle-loading shot guns. All communications must be addressed to “The Secretary.”

[2517]

BRIDER, GEORGE, 30 *Bow Street, Covent Garden, London.*—Implements for breech and muzzle-loading firearms.

[2518]

BRINE, LIEUT., R.N., *Army and Navy Club.*—Model of Crimean monument; specimens, &c.

[2519]

BRITTEN, BASHLEY, *Redhill.*—Projectiles for rifled cannon.

[2520]

BROWN, CAPTAIN, *Abbey Mills House, Romsey.*—Artificial parchments; compressed gunpowder cartridges; solid paper tubes; self-lubricating ramrod.

[2521]

BROWN, JOHN, 8 *Shelley Terrace, Stoke Newington.*—Repeating pistol, to fire fourteen times without reloading.

[2522]

BURNETT, CHARLES J., *Edinburgh.*—Various firearms; anti-Crimean elongated projectile, chain-shells, and other projectiles.

[2523]

CALISHER & TERRY, *Whittall Street, Birmingham, and Norfolk Street, Strand.*—Terry’s patent breech-loading rifles and pistols. (See page 9.)

[2524]

CLINTON, LORD ARTHUR PELHAM, R.N., & HART, GEORGE W., *Southsea.*—Shot proof port, or embrasure, fitted for batteries or ships of war.

[2525]

COLLINSON, T. B., LT.-COL., *Chatham.*—Model of proposed land defences for Plymouth: models of parts of Preston and Colchester barracks.

[2526]

CULLING, CHARLES, *Downham Market, Norfolk.*—Patent safety gun.

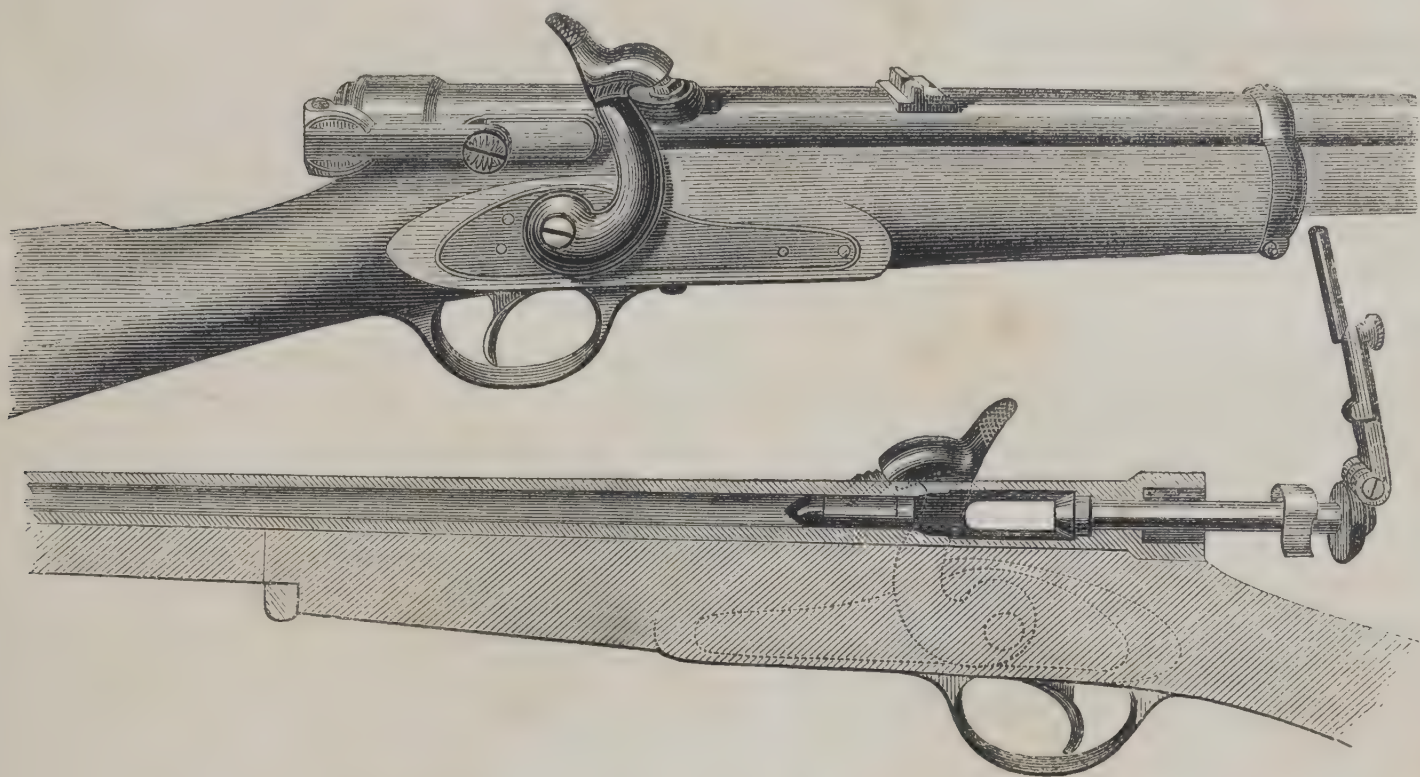
[2527]

DAW, GEORGE H., 57 *Threadneedle Street, London.*—Patent central fire breech-loading gun and cartridge. (See page 10.)

[2528]

DONNELLY, Capt., R.E., *South Kensington Museum.*—Rolling drawbridge, requiring neither counterbalance, weight, nor extra length.

CALISHER & TERRY, *Whittall Street, Birmingham, and Norfolk Street, Strand.*—Terry's patent breech-loading rifles and pistols.



TERRY'S PATENT BREECH-LOADING RIFLES AND PISTOLS.

"THE TIMES," *July 22nd, 1858.*

"A breech-loading rifle carbine, the invention of Mr. Terry, of Birmingham, has been under test on board Her Majesty's ship *Excellent*, under the superintendence of Captain Hewlett, C.B., from May 10th until the present time; during which time 1,800 rounds have been fired from it with unprecedented accuracy at various ranges, without cleaning the weapon; which, notwithstanding, gives no recoil; in proof of which Captain Hewlett gave the inventors the following certificate, which is fixed on the stock of the gun:—

'This is to certify that I have seen 1,800 rounds fired from this rifle without cleaning.

' July 20, 1858.

' R. H. HEWLETT.'

The rifle missed fire but twice in the 1,800 rounds, and, whether discharged by officer or man, 86 per cent. were 'hits.' Yesterday the rifle was taken to the camp at Browndown, and its capabilities exhibited before the troops and Instructors in Musketry of the 15th Foot (Lieutenant Cuthbert) and Royal Marine Light Infantry (Major Lowder). The practice at 700 and 800 yards was

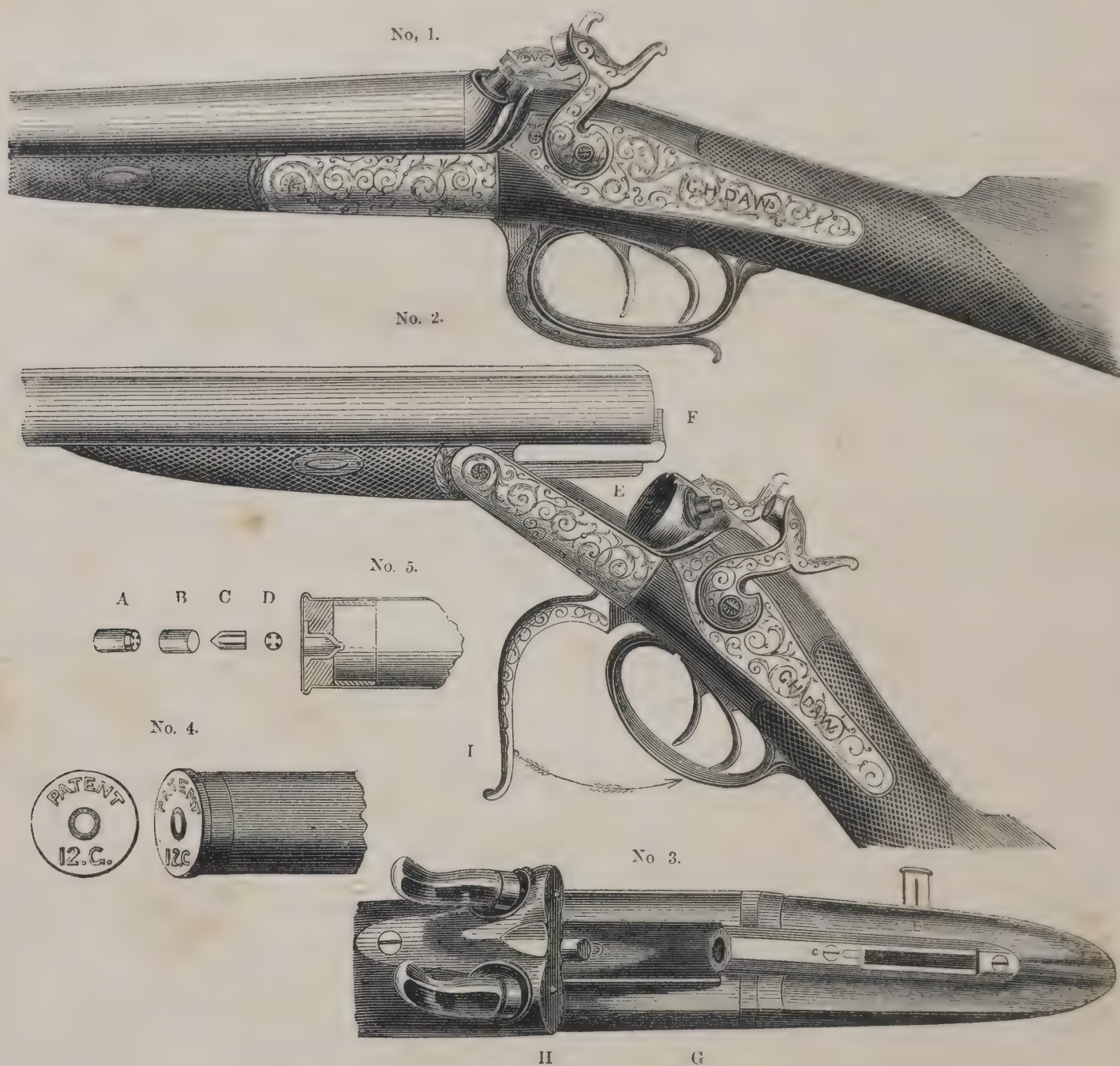
marvellous, notwithstanding a very powerful wind, and will be continued to-day. Its advantages over the old pieces are, 3lbs. less in weight and five shots to one in time of firing, giving it the advantages of a revolver with a tremendous range, and no necessity for cleaning out under about a couple of thousand rounds."

The Terry rifle has, since the publication of the above, been supplied to the Sydney Government for the whole force of the mounted police; to the rifle corps at Queensland, Australia; to the whole of the free rifle corps, Adelaide, South Australia; to the mounted police of Auckland, New Zealand; to several companies of volunteers at the Cape of Good Hope, Bombay, Madras, Kurrache, India; to the whole of Her Majesty's 18th Hussars stationed at Brighton; and to a mounted volunteer corps at Shanghai, China.

The Adelaide free rifles have accepted many challenges, and have won every prize for which they have contended; including the gold cup and other prizes at Melbourne.

The Terry rifle is much prized by many sportsmen in England, and has been supplied to His Majesty the King of Denmark.

DAW, GEORGE H., 57 Threadneedle Street, London.—Patent central fire breech-loading gun and cartridge.



The extreme simplicity, safety, additional strength, and uniformity in shooting, of the above valuable patented invention, renders it the most perfect breech-loader ever yet produced. The parts are made by novel and patented machinery, insuring a degree of cheapness and accuracy never before attained.

No. 1. Gun complete.

No. 2. Gun opened ready for loading.

No. 3. Part of stock, with hinged fore-part, showing connection for barrels.

No. 4. Form of cartridge, with cap in the centre, and below the surface.

No. 5. Section of cartridge, showing brass cup, with communication hole in centre, and direct into the charge.

A Percussion cap, with brass anvil inside, ready to be placed in brass cup, as shown in Nos. 4, 5.

B Percussion cap.

C Brass anvil, with grooves for communicating the flame to the powder. The conical end is placed towards the fulminate, and receives the blow of the piston from the fall of the hammer.

D Bottom of anvil, showing the grooves and front part, which rest against the shoulder inside the cup, for resisting the blow of the piston.

E Piston points, for exploding percussion caps.

F Self-acting steel slide, for drawing out exploded cartridge cases.

G Socket for receiving and fixing steel bolt on the barrel lump at breech end of barrels.

H Steel bolt for locking and fastening the barrels.

I Lever connected with steel bolt for opening or closing the breech.

((Extract from *Bell's Life*, Nov. 8, 1861.)

"We have carefully examined the weapon ourselves, and we earnestly recommend it to the attention not only of our sporting readers, but also to the whole of the gun-making fraternity."

(*The Field*, Dec. 21, 1861.)

"The gun which is represented above has been tried in our presence with complete success by Mr. Daw, the well-known gunmaker, of Threadneedle Street, London. We therefore do not imagine that there will be the slightest tendency in this gun to get out of order, and, as far as we have been able to try it, we have the highest opinion of its merits."

The principle illustrated in the gun exhibited is applicable to every description of firearm.

[2529]

DOUGALL, J. D., 23 *Graham Street, Glasgow*.—Breech-loading firearms.

Patent lockfast breech-loaders, the mechanism of which interlocks the barrels and stock by a powerful lever and eccentric rod.

[2530]

DRYDEN, CHARLES, 10 *Denmark Street, Soho*.—Gun locks.

[2531]

DU CANE, Capt. EDMUND FREDERICK, 13 *Victoria Road, Kensington, London*.—Self-balanced iron shutters; rolling drawbridges, &c., without counterweights.

[2532]

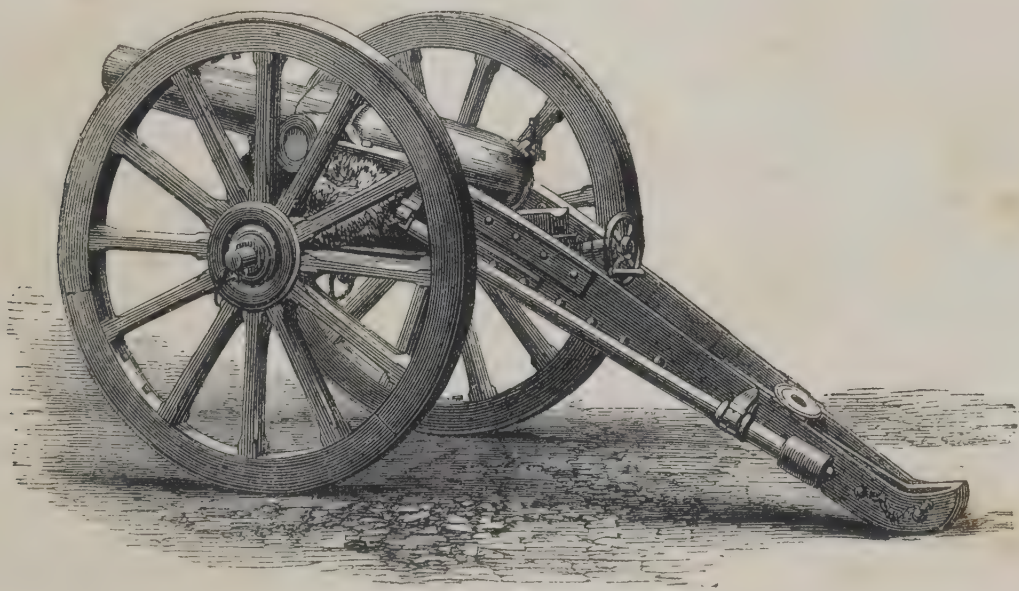
EBRALL, SAMUEL, *Shrewsbury*.—A pair of double sporting guns and rifles; a double breech-loading gun, a double rifle.

[2533]

FAIRMAN, JAMES, 23 *Jermyn Street*.—1 double breech-loading gun, with sliding barrels; 1 double breech-loading gun, with drop barrels.

[2534]

FAWCETT, PRESTON, & Co., *Liverpool*.—Gun on carriage and boat-slide combined, for land and sea service.



Fawcett, Preston, & Co., are the designers and manufacturers of the rifled gun and wrought-iron carriage, for mountain service and mule transport.

This gun carries a 7lb. shell or 9lb. solid shot, and gives, with an elevation of 5°, a range of 1,800 yards, and is also specially adapted for a boat gun, for use afloat or ashore. The exhibitors have adapted to the carriage above illustrated a wrought-iron boat slide of simple construction, which, by the addition of a pair of wheels on board, is converted into a land

carriage, and can be run ashore, obviating the inconvenience of carrying a separate carriage specially for land service in the boat, and lessening the difficulty of transferring the gun, from the boat slide to the land carriage in the ordinary way.

Fawcett, Preston, & Co. also manufacture all descriptions of heavy ordnance and field artillery complete, with carriages, limbers, &c. &c., in brass, steel, or iron, smooth-bored or rifled. They are also licensees under Blakely's patent.

[2535]

FAWCUS, GEORGE, *Alma Place, North Shields*.—Civil and military scaling ladders.

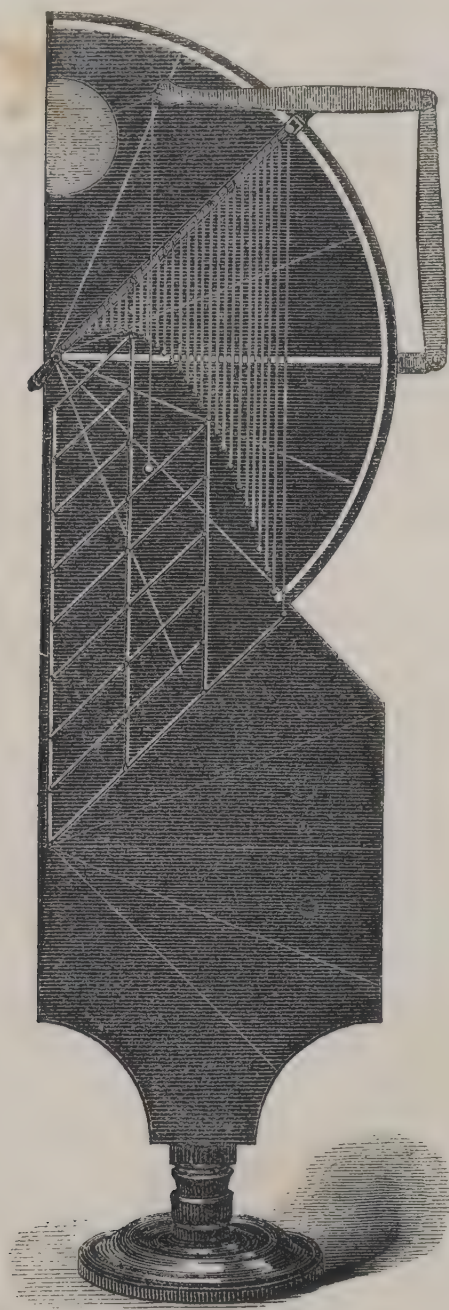
Key-bolts connect the ladders (in lieu of lashings); port the ends, forming a continuous smooth surface for cleats, at the joinings on the side pieces, meet and sup- the hand to grasp and slide along.

[2536]

FOWKE, CAPT. FRANCIS, R.E., *Park House, South Kensington*.—Collapsing canvas boat pontoons; fire engine for military purposes. See SHAND & MASON, *Class VIII*.

[2537]

FOX, CAPT. & LIEUT.-COL. A. LANE, *Grenadier Guards, Park Hill House, Clapham, S.*—Model illustrating the parabolic theory, for the range of projectiles in vacuo.



MODEL ILLUSTRATING THE PARABOLIC THEORY.

The three forces which combine to influence the flight of a projectile in the air are—

1. The velocity caused by the exploded gunpowder producing a movement of transition, in continuation of the axis of the piece; 2. The force of gravitation drawing

the bullet to the ground; and, 3. The resistance of the air.

The parabolic theory deals only with the first two forces, viz., the movement of transition and the movement of gravitation.

In the model of the parabolic theory of projection in vacuo, the movable bar, to which the wires with white beads at their ends are attached, represents the line of fire. This bar can be set to any angle of elevation or depression. The movable bar is divided into 30 equal parts, representing the points at which the bullet, if influenced by the force of transition only, would arrive at the end of each successive second of time. In the present instance, it is supposed to move at the small velocity of 321.6 feet, or 107 yards, per second. From each of the thirty points on the movable bar a wire is suspended, with a white bead at the end; these wires increase in length, as the squares of the times according to the fall of gravitation, at each successive second of time. By this means a uniform curve is produced throughout the parabola, each bead representing one second of the actual flight in vacuo. The parallelogram apparatus is movable on pivots, by which it may be adjusted to any angle at which the movable bar may be set, the three points of the parallelogram always coinciding with the beads indicating the tenth, twentieth, and thirtieth second of time; thereby demonstrating, at all angles of elevation or depression, the operation of a compound force. To show how the range on any plan may be obtained from the impetus, another contrivance has been added to this model. The impetus is the height to which the ball would ascend if fixed vertically. At the distance of four times the impetus a protractor is fixed, and a movable arm is used to hold a thread, with a weight at the end, upon the surface of the board. To use it, mark off on the protractor an angle equal to the elevation, prolong the line till it touches the line of fire, let fall a vertical line upon the plane, and the intersection will be the range upon the plan.

For further particulars, see the "Journal of the Royal United Service Institution," volume v., page 497.

[2538]

GARDEN, R. S., 29 *Piccadilly*.—Punt gun on Prince's breech-loading principle.

[2539]

GIBBS, GEORGE, *Corn Street, Bristol*.—Breech and muzzle-loading double guns; sporting and target rifles.

[2540]

GLADSTONE, HENRY, & Co., 22 *Lawrence-Pountney Lane, London*.—"Capt. Haye's seamless skin cartridge."

[2541]

GISBORNE & BOLTON, 3 *Adelaide Place, E.C.*—Electrographic target and signal apparatus.

[2542]

GRAINGER, JAMES, 60 *Vyse Street, Birmingham*.—Gun, pistol, rifle, and military locks.

[2543]

GREENFIELD, JOHN, & SON, 10 *Broad Street, W.*—Portable Minié bullet compressing machine; selection of bullets, bullet-moulds, &c.

[2544]

GREENER, WILLIAM, *Rifle Hill Works, Birmingham*.—Rifle artillery, double guns, rifles, &c.

Awarded First Class Medals, Exhibition, 1851; New York, 1853; and Paris, 1855, Two Silver Medals.

WILLIAM GREENER is the inventor of the present improved system of gunnery, as attested by a public Parliamentary grant, session 1858.

Double guns, of the very highest quality, made also for exportation, at £6, £8, £12, £15, to £35 each.

Double rifles, from £8 to £40 each.

Single guns, from £3 to £15.

Single rifles, £3 to £25.

Elephant, lion, and tiger shell rifles.

Harpoon and sealing guns. Punt and all other descriptions of guns for wild fowl shooting.

The exhibitor contracts for every description of naval and military small arms to any extent.

W. GREENER, if required, can furnish these arms as perfect in their shooting as any rifle ever made, the "Whitworth" not excepted.

[2545]

HALE, WILLIAM, 6 *John Street, Adelphi*.—Hale's war rockets, comet shells, and apparatus for directing their flight.

[2546]

HARRINGTON, JOSIAH, 6 *Lansdowne Terrace, West Brixton, S.*—A self-priming musket.

[2547]

HEMMING & Co., 21 *Moorgate Street*.—Electric targets, iron roofing for churches, and other buildings.

[2548]

HODGES, E. C., 6 *Florence Street, Islington*.—Improved breech-loading actions.

[2549]

HOLLAND, HARRIS J., 98 *New Bond Street*.—Breech-loading guns and rifles, of various recent patents.

[2550]

JACKSON, RICHARD, 30 *Portman Place, Edgware Road, London, W.*—Rifle, muzzle-loader.

[2551]

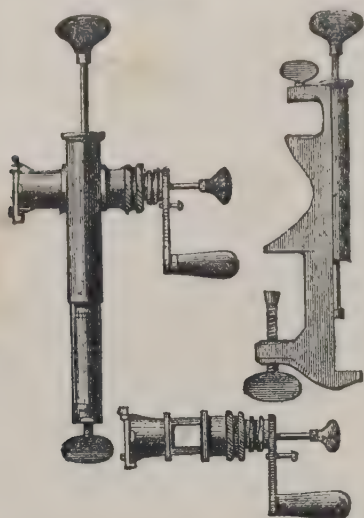
JAMES, COLONEL SIR HENRY, *Ordnance Survey Office, Southampton*.—Maps, books, and instruments of the Ordnance Survey, with specimens of photozincography.

[2552]

JEFFERY, ALFRED, *Limehouse, E.*—Muzzle-loading rifled ordnance projectiles, showing application of Minié rifle principle to cannon.

[2553]

JEFFRIES, GEO., *Golden Ball Street, Norwich*.—Patent portable cartridge machine; patent breech-loading gun.



IMPROVED MACHINE FOR FILLING CARTRIDGES FOR BREECH-LOADING FIREARMS.

These machines have been extensively used for the last two years, and have just had several important improvements; the cross-box, or turnover tool, being made removable, so that one box can be changed for another. They are suitable for different sized cartridges, viz., 12 or 16 guage. This arrangement admits of the entire apparatus being fitted in an ordinary gun-case. It is of great importance to gentlemen travelling, and is the only patent machine in the kingdom. It is in general use amongst gentlemen and gunmakers in England, Ireland, and Scotland, and is sold by all respectable gun-makers.

The exhibitor is the sole maker and patentee.

[2554]

JONES, JOHN, *Serjeant Major, Brompton Barracks, Chatham*.—Iron-band gabion, sap-roller, field suspension-bridge, floating-bridge, field bedstead, ambulance litter, rafters for stabling and hutting, field trip.

IRON-BAND GABION FOR FIELD AND GARRISON WORKS.—Is formed of ten bands of galvanized sheet iron, 20-gauge, each three and a quarter inches wide, and seventy-seven inches long, fixed, in a circle, on twelve deal or other pickets, three feet long. It is constructed by two men in five minutes by passing the bands, basket-fashion, down the sides of the pickets. After many trials and reports of its efficiency, it supersedes, by an order from the Secretary of State for War, dated 11th December, 1860, the old cumbersome wicker gabion. Its weight with the pickets is 29 lbs. It is very convenient for carriage, and is very easily repaired in sieges.

SUSPENSION BRIDGE FOR ALL ARMS AND GUNS.—Is formed by any number of bands, from one to four, laid on each other according to the strength, width, and length of the bridge required, and connected together in their lengths by bolts and nuts through small holes at their ends. When thus connected, they form long strips, and so act as bearers to the superstructure or planking. The ends of the bearers are formed into loops, and fastened with bolts and nuts; through these loops is passed a horizontal pole placed behind two stout baulks of timber sunk in the ground, and hauled taut. In this way the bridge is steadied, and rendered fit for the service required of it.

SUSPENSION BRIDGE FOR INFANTRY.—Is formed as above, but without planking or superstructure of any kind, by placing the bearers close together, and weaving them at intervals with the gabion pickets. The pickets so woven, besides preventing a lateral separation of the bands, serve as cleats to keep the men from slipping in crossing.

FLOATING BRIDGE FOR ALL ARMS AND GUNS.—This is formed in the same way as the two preceding, using a greater or less number of bands according to the nature of the presumed weight to pass over it, as cavalry, infantry, artillery, &c., and is supported on piers of boats, pontoons, trestles, or other contrivances.

These three bridges, subjected to examination by a permanent committee of Royal Engineers, have been commended for their ingenuity, and a printed description of them has been ordered by the Secretary of State for War to be circulated to officers commanding Royal Engineers.

SAP-ROLLER.—Is made in the same manner as the gabion, except that the outer circle has two lengths of bands connected together, and the inner only one; the intervals between the two circles being filled with fascines.

FIELD BEDSTEAD.—AMBULANCE LITTER.—These can be formed in the field of rough timber or any other chance material, using the iron-bands in place of sacking or planking.

RAFTERS FOR STABLING AND HUTTING.—In the construction of these field services, the bands can be used for the rafters.

TRIP FOR CHECKING INFANTRY AND CAVALRY.—This is formed by laying the bands singly on the ground three or four feet apart, edge-wise and buttoned, and connecting them by wooden toggles attached to wire or rope three or four feet long. Thus connected, they are laid in rows, parallel and chequerwise, at any distance that may be considered best; the parallel rows being held in their places by rope or wire. This kind of obstacle would, on service, be found to occasion much more confusion than crows-feet, trous-de-loup, &c.

The price of the bands is determined by the nature of the contract entered into by the War Department.

The iron-band, primarily, is for the construction of gabions; but it can be adapted to the various field purposes above described, without, in any way, impairing its efficiency for gabions; and its use in these various forms enables the equipment of the Engineer Department to be considerably reduced; thus saving an immense expenditure to the country both in the provision of *materiel* and in transport.

[2555]

JOYCE & Co., *Upper Thames Street*.—Percussion caps, gun wadding, cartridges, &c.

[2556]

LANCASTER, ALFRED, *27 South Audley Street, Grosvenor Square*.—Improved Lancaster rifle, specimens of fine sporting firearms.

[2557]

LANCASTER, CHARLES WILLIAM, 151 *New Bond Street, London*.—Breech-loading guns and rifles, for sporting purposes. Military rifles, oval bore. New method of iron-plating ships of war.

OVAL BORE CANNON: WROUGHT-IRON AND CAST-IRON SHELLS.—This gun illustrates the application of this system to cast-iron service guns. The specimen shown has fired 604 rounds of wrought-iron shell at high angles of elevation.

ADVANTAGES—Great range and accuracy when the elongated shell is used. Power to use molten iron in shell, and at the same time the service round shot and shell, as well as grape and canister, may be used without damage to the rifling, and with great precision, the range being equal to the usual service gun.

OVAL BORE RIFLES: MILITARY PATTERN.—The system of construction followed in these rifles may be described as follows:—The inside of barrel is cut by proper machinery in a spiral form, the difference between major and minor axis being $\cdot 012$ of an inch. This rifle is adopted in Her Majesty's service, being the arm of the Royal Engineers, and using the usual Enfield

rifle ammunition, the system, as proved by actual service during the Indian Mutiny, gives the highest results as a military weapon and arm of the first precision. The trials just conducted at Woolwich, by order of the War Office, have resulted in the complete success of these rifles.

BREECH-LOADING SHOT GUNS.—The special advantages of this system consist in the absence of any pin to the cartridge, a perfectly central fire, and extreme simplicity of mechanical arrangement.

PROTECTING THE BOTTOMS OF IRON SHIPS.—Copper sheathing by this method is used to protect the portion of the iron hull below the water line. A layer of bitumen is placed upon the iron and screw rivets at the junction of the plates to prevent the disruption of the copper sheathing. The bitumen interposed between the copper and iron completely prevents any galvanic action.

[2558]

LANG, JOSEPH, 22 *Cockspur Street, London*.—Guns; rifles; new improved revolvers and other pistols; air guns; percussion walking-stick gun and rifle.

[2559]

LEETCH, JAMES, 68 *Margaret Street, Regent Street, London, W.*—Breech-loading firearms, empty cartridges, models, &c.

[2560]

LEWIS, GEORGE EDWARD, 32 & 33 *Lower Loveday Street, Birmingham*.—Sporting guns; pistols; military and sporting rifle.

[2561]

LONDON ARMOURY COMPANY, *Bermondsey*.—Long Enfield rifles, machine-made; Kerr rifles, ditto; Kerr's revolving pistols, Adams' ditto.

[2562]

LOVELL, MAJOR J. W., *Brompton Barracks, Chatham*.—Sap shield.

[2563]

LUCAS, W. H., 109 *Victoria Street*.—Model of a self-adjusting rolling bridge for forts, requiring no counterweights.

[2564]

MACINTOSH, JOHN, 40 *North Bank, Regent's Park*.—Breech-loading firearms, ordnance, and cartridges.

[2565]

MANTON, J., & SON, 4 *Dover Street, Piccadilly*.—Best guns and rifles.

[2566]

MARRISON, ROBERT, *Great Oxford Street, Norwich*.—Self-extracting breech-loader, vertical cylinder cartridge chargers; specimen of ornamental engraving.

[2567]

MERSEY STEEL & IRON COMPANY, *Liverpool*.—Gun blocks; guns; armour-plates; and the first battery-plate ever broken.

[2568]

MILLER & PEARER, *Glasgow*.—Brass cannon.

[2569]

MONT STORM, WILLIAM, 3 *Rood Lane, E.C.*—Patent breech-loading military and sporting firearms.

MONT STORM'S BREECH-LOADING ARMS.—Breech-loading arms may be divided into twelve different systems or "species," and there are various "varieties" of at least eleven of these species. The twelfth species (Mont Storm's "SELF-SEALING CHAMBER SYSTEM") is of comparatively recent development, and its plan is adapted to universal application to every style and class of both military and sporting arms, or the ready conversion of the present muzzle-loading arms to breech-loaders. Some of its many points of merit may be enumerated as follows:—

It has a chamber, but no lever—lateral, vertical, or other—to catch in the accoutrements, dress, or bridle-rein.

It is confined to no special ammunition.

The charge may be varied, but the arm cannot be overloaded.

The explosion is within a solid chamber; the recoil is upon a solid breech.

The connection between the stock and barrel is strong, graceful, and "FIXED:" thus it is adapted for the use of the bayonet for infantry.

The opening and closing of the chamber is effected, with unprecedented ease and rapidity, with the mere finger and thumb, even when the weapon and the soldier are lying upon the ground; and in the case of cavalry in action, the left hand remains entirely free, to govern the

reins. It is a perfect MUZZLE-LOADER. The force of the explosion, irrespective of special ammunition, CLOSES the joint, in contrast to its effect in other breech-loading arms: thus there is no escape of gas.

It cannot stick fast, or clog, by rust or powder dirt.

There is no sliding or abrasion of one surface upon another, in opening and closing the breech: thus there is no friction or wear.

In the insertion of the cartridge, the ball constitutes the handle or ramrod—an important feature.

It cannot be fixed, accidentally or purposely, till the chamber is locked in place; and the locking device is solid, "self-acting," and INFALLIBLE of operation.

It is extremely simple, involves no delicate parts, and cannot easily get out of order.

There are no specialities of lock, stock, barrel, or mountings; thus there are no mysteries in its repair, it is of economical construction, and any approved species of "SELF-ACTING PRIMER" may be applied to it.

These arms may be thoroughly and quickly cleaned without the application of WATER.

Though these arms are only now about to be brought before the public in this country, they have received more approbation and praise, at numbers of public trials before Governmental and military authorities in America, than any arm hitherto known.

[2570]

MOORE & HARRIS, *Military Contractors, Great Western Gun Works, Birmingham*.—Sporting guns, breech-loaders; English volunteer prize rifles, &c.

GUNS, No. 5,035 AND No. 5,050.

Bar and back-action sporting breech-loading double guns, with improved method of holding the breech ends of the barrels down to the breech-piece. One of the shortcomings of the ordinary breech-loader being, that the hook-shaped contrivance for holding the barrels down, is not immediately under the strain with which it has to contend in the discharge of the gun; the centre of the breech-piece being cut away, all the strain acts upon the attaching of the turnpin (in the case of the breech piece), and upon a hook between the two barrels (in the other direction). The guns exhibited are constructed upon an improved, more perfect, and much simpler plan; the loop upon each barrel receiving the end of a steel tumbler-shaped bolt, by turning the lever to guard when the gun is closed, which bolt turns under the surface of the breech-piece, and is consequently much safer; the parts are less subject to wear either by use or the vibration of shooting. The weight of these guns does not exceed that of the ordinary muzzle-loader of same calibre.

Rifles, double and single, are also made on this principle, to which its advantages are quite as valuable and appropriate.

Price of improved breech-loading double guns, complete in case, with all implements, and leather cover, forty-five pounds (£45).

DOUBLE GUN, No. 5,052.

Bar double gun, so constructed that all the detonating is completed on the breeches, protecting the joint of false breech from the flame of cap or corrosion; and the side lock-screw passing through the iron, renders a well-proportioned and properly-striking hammer compatible with the above arrangement.

A very desirable feature in this gun is, that the part of the stock which is first destroyed by use, in the ordinary gun, is perfectly protected; and also, none of the sharp edges (which present themselves round the detonating of the regular bar gun), when the barrels are taken from the stock.

Price complete, with implements in case, and leather cover, thirty-five pounds—(£35).

Specimens of gun-barrel tubes, in the rough, oxidated, to show the variety of twists and figures produced by the manner of working Rose's patent iron; also, specimens for machinery made by the same process as the gun-barrel iron, but on a larger scale, showing more than four thousand square rods of iron and steel, as seen by the presented ends of the specimens; and which would be maintained and seen by microscopic power if drawn down to the sizes of the smallest specimens. The extent to which it will endure friction, without increasing temperature, is one of its valuable qualities for machinery and gunnery. Specimens of the same for cable-links.

[2571]

MORTIMER & SON, *Edinburgh*.—Single rifle in case, improved rifling and sight, breech-loading gun, double rifles.

[2572]

MURCOTT & HANSON, 68 *Haymarket, S. W.*—Samples of four patents for breech-loaders, and patent for firing explosive compounds.

[2573]

NEWTON, WILLIAM EDWARD, 66 *Chancery Lane.*—1. New gabion. 2. Improved riveting for interior slopes of field batteries. 3. Portable camp fire-place.

[2574]

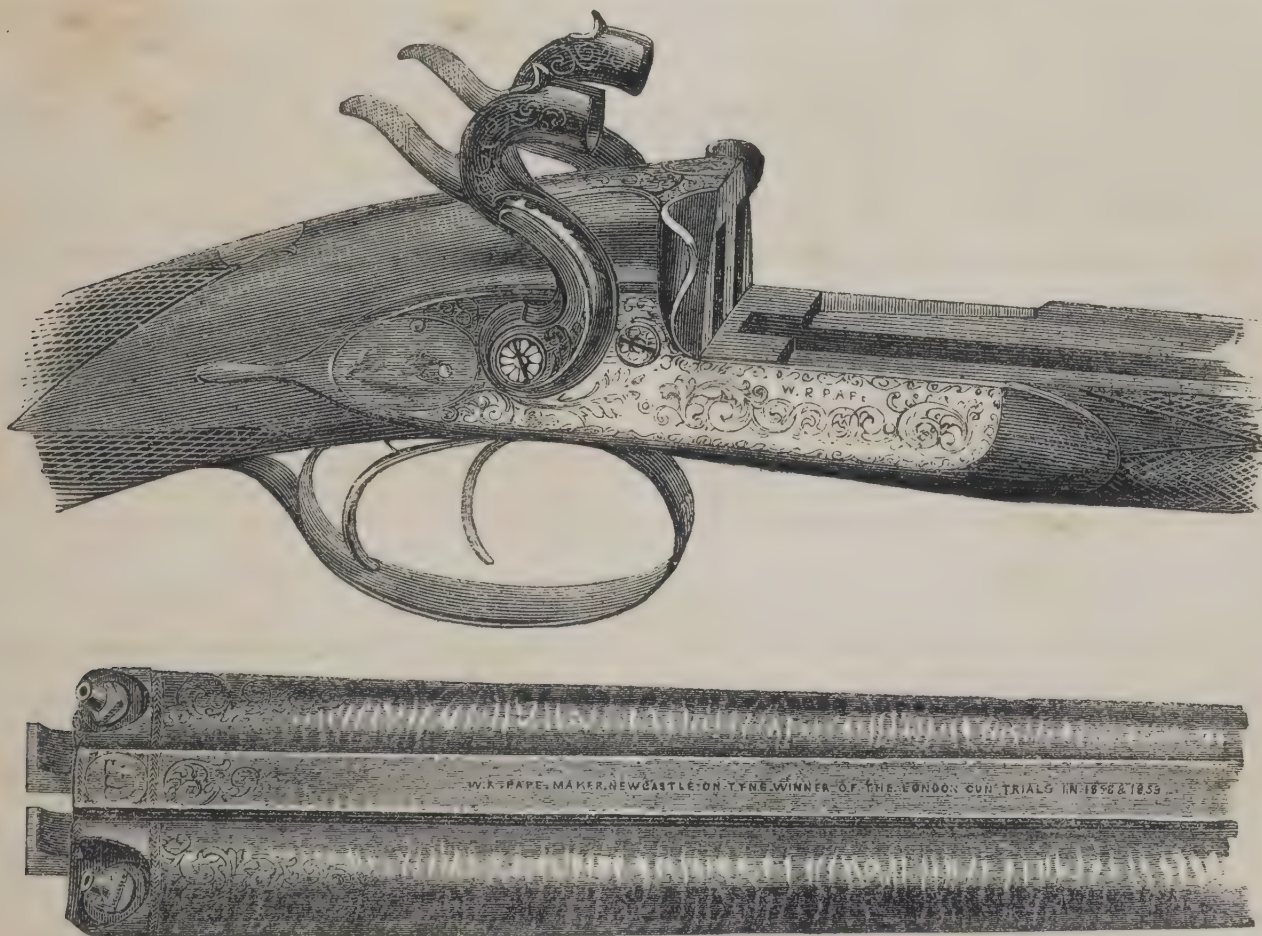
PAPE, WILLIAM R., 36 *Westgate Street, Newcastle-on-Tyne.*—Sporting guns and rifles.

This exhibitor was, for two successive years, the winner of the great gun trials held in London in 1858 and 1859.

Those guns and rifles have won the approval of the most celebrated and experienced sportsmen at home and

abroad, who have pronounced them the best sporting weapons of the present day.

The barrels are made from W. R. Pape's improved laminated steel, at his works, Newcastle-on-Tyne.



[2575]

PARFREY, Y., *Victoria Road, Pimlico.*—Breech-loading double gun, sliding action, drawing its own cartridges.

[2576]

PARSON, WILLIAM, *Swaffham, Norfolk.*—Six improved double guns.

[2577]

PARSONS, P. M., 9 *Arthur Street West, London Bridge.*—Patent breech-loading firearms. (See pages 18, 19.)

[2578]

PATON, EDWARD, *Perth.*—Pair of double breech-loaders, double breech-loading rifle, single long-ranged rifle.

[2579]

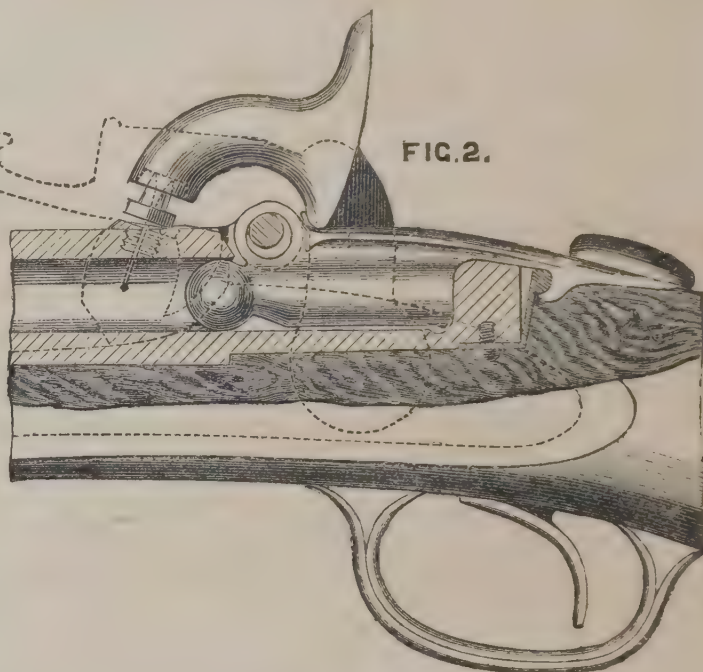
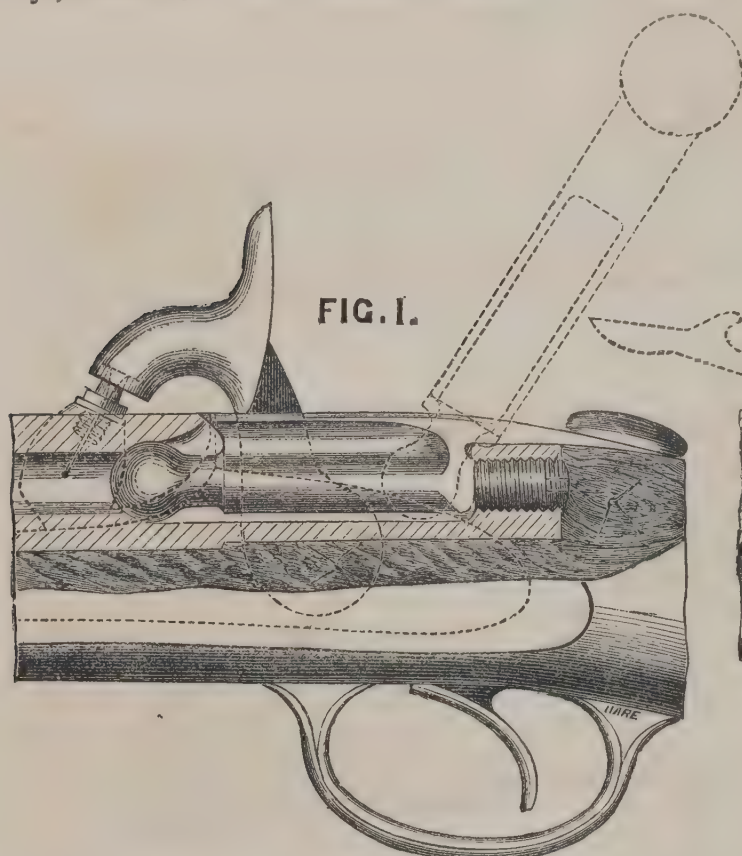
POTTER, JOHN, *Lynn, Norfolk.*—Breech and muzzle-loading double guns, and machine for compressing rifle bullets.

PARSONS, P. M., 9 Arthur Street West, London Bridge.—Patent breech-loading firearms.

PARSONS' PATENT BREECH-LOADING FIRE ARMS.—This system of breech-loading is applicable both to small arms and ordnance, and consists mainly in constructing the plug to close the breech of a spherical form, and combining it with such other parts as are necessary to carry out its application in different ways, according to the particular purpose for which

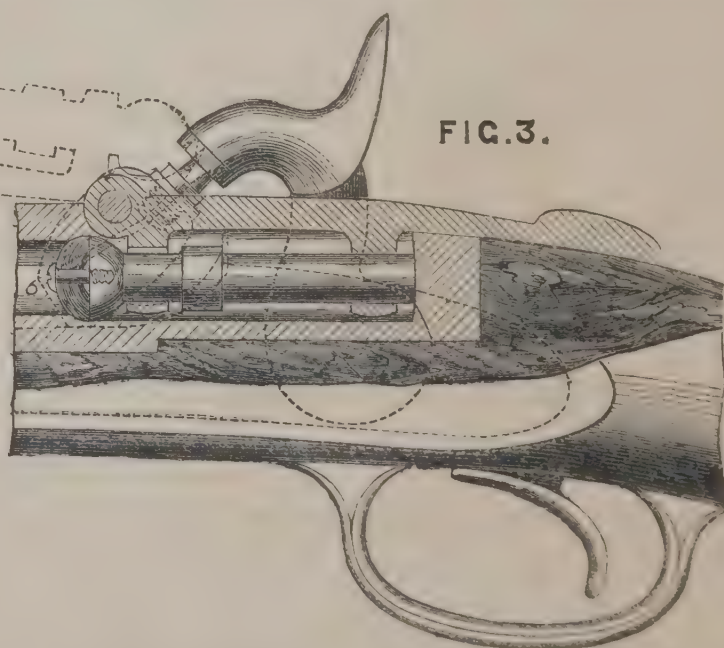
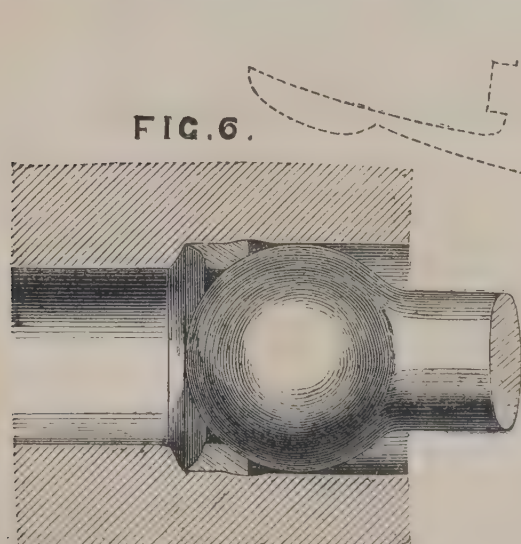
it is used. It also consists of improved methods of making the joint at the breech gas-tight and self-acting.

Figs. 1, 2, and 3 are sections of the breech portion of hand rifles, with the parts in the position they would be at the time of the discharge; the dotted lines in each figure show the position of the plug when the breech is



opened for the insertion of the cartridge. In Fig. 1, the plug consists of a bolt terminating in a knob of a spherical form, which slides in the chamber, and by which it is retained in its place. In opening the breech, the tail end of the plug is lifted up until it is released; the spherical knob, at the same time, turns on its spherical end in its seat, in the manner of a ball and socket; it is then drawn back to the position shown by the dotted lines. The plug

can be removed from the chamber instantaneously when required, by a peculiar movement in one particular position, without removing any pins or screws, for the purpose of cleaning, or, if necessary, to render the arm for the time unserviceable; although it is impossible for it to escape from its place by accident. In Fig. 2, the plug is in one piece with the lid, which is hinged to the breech; in opening the breech, in this arrangement, the



tail end of the plug is lifted, and the spherical end turns in its seat, as before, sufficient play being allowed in the hinge joint for that purpose; it is then turned back on its hinge joint, as shown by the dotted lines: in this arrangement, the gas valve for maintaining a tight joint, to be afterwards described, is not applied, it being intended to use a cartridge with a greased felt wad at its base,

which supplies its place. In Fig. 3, the breech is opened in the same manner as in Fig. 2, except that the requisite play is allowed between the lid and the plug. In all these arrangements, the hammer is so arranged that when it falls on the nipple at the discharge of the piece, it also covers the lid, and thereby prevents all possibility of the plug rising out of its place.

PARSONS, P. M.—*continued.*

Figs. 4 and 5 show the application of this system to a cannon. In this, a complete sphere is secured in a chamber in the breech of the gun by a nut; both the sphere and the nut have a cylindrical hole through them corresponding to the bore of the gun. The sphere is capable of turning freely on its own centre in its seat, and motion is given to it by the lever. When in the position shown at Fig. 4, the charge is introduced through it and the nut; it is then turned a quarter of a turn to the position shown at Fig. 5, by which the aperture through it is brought across the bore, and the breech thereby closed. The lever is so arranged that it covers the touchhole, and thereby prevents the gun being discharged, except when the plug is in the proper position

and the breech closed. The lever is also so constructed that it can be removed out of its place almost instantaneously, and the gun thereby rendered useless for the time, if necessary.

Two different methods of securing a self-acting gas-tight joint at the breech are employed, according to the form of the plug used. When it is of a conical form, or a sphere turning in its seat, as in Figs. 1, 4, and 5, a ring of copper or other soft metal is fitted in between the plug and the breech, as shown on an enlarged scale at Figs. 6 and 7, which the force of the explosion drives or wedges in between the spherical plug and its seat in the breech of the gun. When a flat surface is employed to close the breech, a hollow spherical cup, or

FIG. 4.

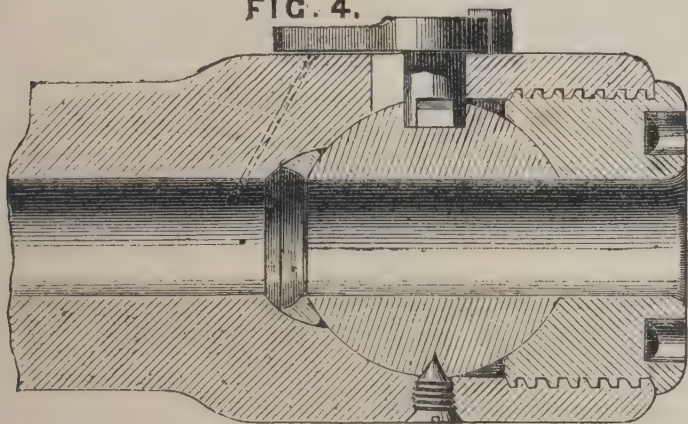
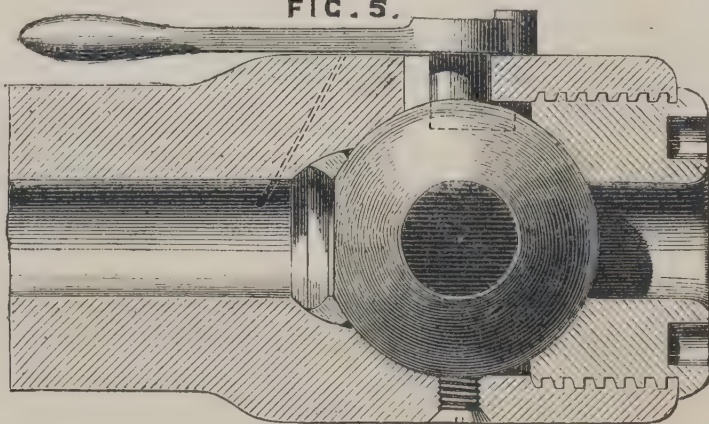


FIG. 5.



disc of copper, is attached to the plug, with its convex side presented to receive the force of the explosion, and its periphery resting against the base of the plug and the interior of the barrel or breech, as shown at Fig. 8. On the discharge of the piece, the force of the explosion tends to flatten and spread out the cup or disc, and its periphery is thereby forced into close contact with the interior of the breech, and the joint thereby made good.

The advantages claimed for these breech-loading rifles are, that they are easily and quickly loaded; perfectly gas-tight; so simple and strong that they cannot get out of order; so secure that it is impossible an accident can occur from their use, even through the greatest carelessness;

and that they admit of being manufactured at small cost by self-acting machinery, and so that all the parts of any rifle may be interchangeable with those of any other. The arrangements shown at Figs. 2 and 3 have probably a slight advantage in facility of loading, but all the other points are strongly developed in the arrangement shown at Fig. 1: in fact, it is hardly possible to conceive a more secure or simple breech-loading arrangement, as the moving parts are reduced to a minimum—viz., to one—and that a simple bolt of hardened steel, which is proof against injury.

The advantages claimed for the arrangement adapted to ordnance are, that the surfaces which make the breech joint are perfectly protected from injury; and as in the

FIG. 8.

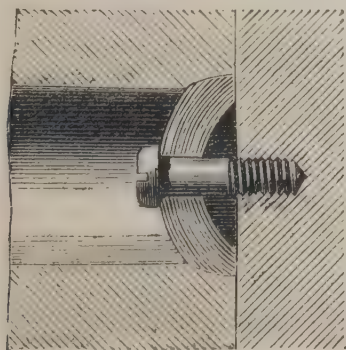
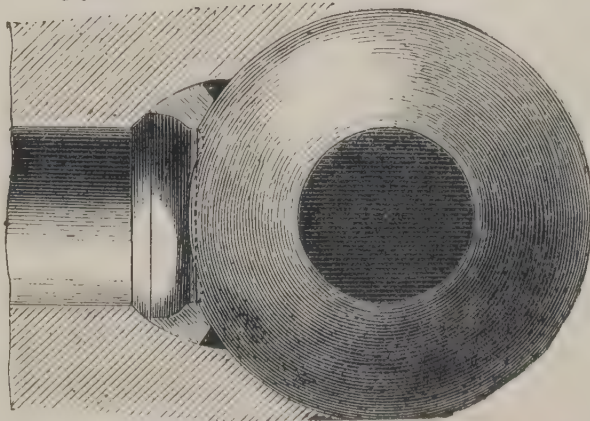


FIG. 7.



working they slide upon each other, they are constantly scraped clean, and free from deposit and other extraneous matter, and the joint is made tight by the explosion of the charge itself, and does not depend upon the proper tightening up of a screw or wedge. The opening and closing of the breech is effected by one simple movement of the lever, and the gun can consequently be loaded and discharged with the greatest rapidity, and with but a small fraction of the force necessary where a screw, wedge, or other mechanical appliance, is employed to force up the plug in opposition to the explosive power. The plug not having to be lifted out of its place in opening the breech, its weight is not on this account confined to any limit; it is, therefore, made five or six

times as heavy as those that require removal in working the gun, by which a sufficient amount of inertia in it is secured, and the strain on the breech screw thereby very materially reduced. The strength of the breech is also not impaired by having a large slot cut through it. There is no chance of injury occurring to the breech screw from neglect in properly tightening up, as it is never unscrewed, except when required to remove the plug for the purpose of examination or cleaning. When guns of this description are used in casemate batteries, or between deck on board ship, the smoke from the discharge can be prevented from escaping at the breech by inserting the shot into the nut before opening the breech.

[2580]

PRINCE, F. W., 15 *Wellington Street, London Bridge*.—Improved breech-loading cannon and small arms.

[2581]

PURSALL, W., & Co., 45 *Hampton Street, Birmingham*.—Percussion caps; military and sporting ammunition.

[2582]

REEVES, CHARLES, *Charlotte Street, Birmingham*.—Swords, field and dress; military rifles, and rifles to load either at breech or muzzle.

[2583]

REILLY, E. M., & Co., 502 *New Oxford Street*.—Guns, breech-loaders, double rifles, patent revolvers, &c. (*See page 21.*)

[2584]

RESTELL, THOMAS, 43 *Broad Street, Birmingham*.—Breech-loading rifles and small cannon.

[2585]

RIGBY, WM. JNO., *Dublin*.—Double and single rifles and shot guns; a breech-loading staunchion gun, &c.

[2586]

RICHARDS, W., & Co., *Birmingham and London*.—Breech-loading rifles, guns, cannon, &c.

[2587]

SCHLESINGER, JOSEPH, *George Street, Birmingham*.—Patent needle firearm breech-loader.

[2588]

SCOTT, M., 26 *Parliament Street, Westminster*.—Sunken, but movable barrier, to exclude enemies' ships from ports.

[2589]

SCOTT, W. & C., 95 *Bath Street, Birmingham*.—Muzzle and breech-loading guns, rifles, and military small arms.

[2590]

SCOTT & ARBUCKLE, 18 *Parliament Street*.—Hythe position trigger, discharged by pressure instead of pull.

[2591]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Models of works of fortifications.

[2592]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Model of proposed barrack at Colchester.

[2593]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Plan of Netley Hospital.

[2594]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Plan for Herbert Hospital (Woolwich).

[2595]

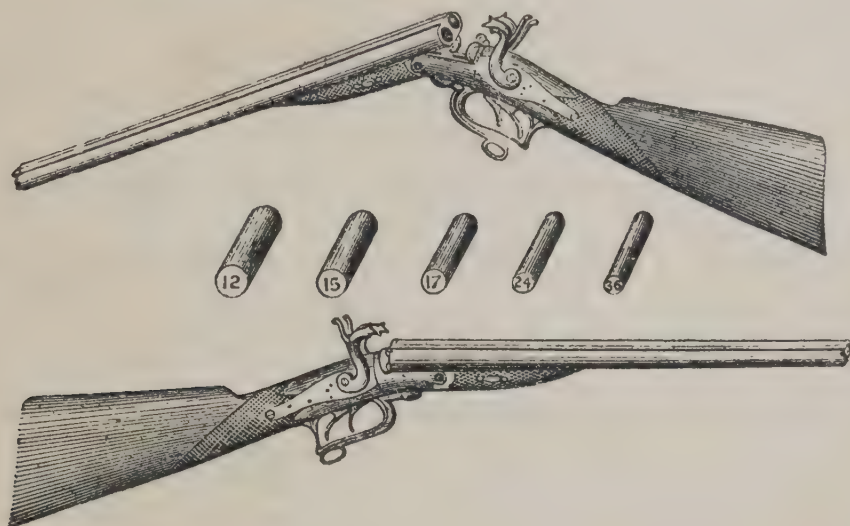
SECRETARY OF STATE FOR WAR, *War Office, London*.—Plan for Regimental Hospital, for 60 and 120 men.

REILLY, E. M., & Co., 502 *New Oxford Street*; Branch Manufactory, 315 *Oxford Street*.—
Guns, breech-loaders, double rifles, patent revolvers, &c.

Specimens of the following are exhibited:—

IMPROVED BREECH-LOADERS, Double and Single, Sporting Guns and Rifles.—These guns are substantial, durable, and possess all the latest improvements, viz., “double grip,” with lever over guard; “sliding action,” to withdraw cartridge cases; “the lockfast,” eccentric

patent, or “vertical action,” central fire, &c. They load with cartridges containing the entire charge, powder, shot, and primer, all in one. Flattering testimonials to the excellence of these guns have been received by the makers, from gentlemen in all parts of the country.



BREECH-LOADERS, of improved construction, Damascus barrels for the twelve or fifteen cartridge, good locks, chequered wood fore-end, well stocked, &c., plain finishing and engraving, from £21 0 0
Ditto with the latest improvements, lever over guard, the workmanship and shooting guaranteed, superior quality, Damascus

barrels, finest locks, &c., made on any of the above-mentioned superior and approved systems, highly finished, &c. £31 10 0
DOUBLE RIFLES ON THE SAME PRINCIPLE.—Breech-Loaders of various calibres, 12 to 36 bore, for India, Africa, and the Colonies, also as pea rifles for rabbit and sea-fowl shooting, the prices commencing at . . 20 guineas

DOUBLE FOWLING PIECES, SUPERIOR DOUBLE RIFLES, &c.—Finest London manufacture.



DOUBLE-BARRELLED GUNS, fine Damascus barrels, 12 to 16 bore, superior locks, handsomely stocked, well engraved and highly finished 12 to 20 guineas.

THE BEST GUN, with first-class Damascus or laminated steel barrels, very superior locks, first-class finishing, &c. £25 0 0

With Brazier's best locks, very superior finishing and engraving, in best oak case and apparatus complete 31 10 0

DOUBLE GUNS IN PAIRS, the barrels to interchange, fitted in double case complete, 30, 40, and 50 guineas the pair.

SUPERIOR DOUBLE-BARREL RIFLES, of various calibres, from 12 to 40 gauge, the

latest improved systems of grooving, flush and long-range sighting, carefully regulated for perfect accuracy 20 to 35 guineas
All the work is done under the immediate supervision of the exhibitors, and they undertake the repair and restoration of guns.

Every article of their own manufacture is guaranteed for efficiency and safety, having been subjected to the severest proof in the rough as well as finished state, and thoroughly tested for correct shooting.

On the premises they have a range of fifty yards for trials of shooting, and every facility for testing their weapons.

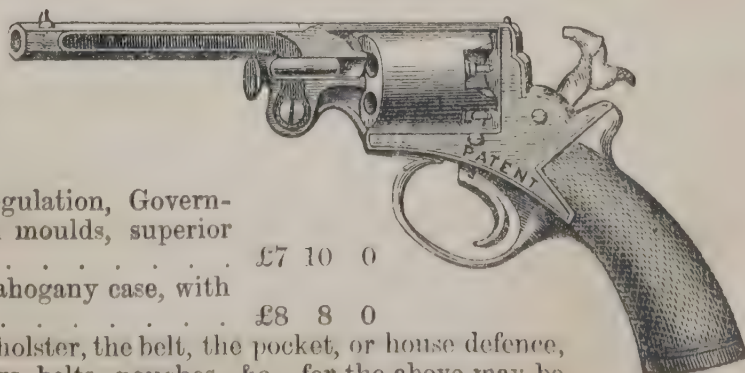
Orders by letter will be attended to punctually, and the goods, if ready, forwarded by same evening's railway train.

REVOLVERS on the latest approved systems, the Ordnance pattern, improved double action lockworks, for quick or slow and accurate firing, direct action lever rammers, bolted cylinders, &c. &c. Likewise Adams's patent, recently perfected and simplified. Deane's, Harding's, Tranter's, Colt's, and others in endless variety.

A revolver of the pattern shown in the illustration, regulation, Government No. 54 bore, in best oak case, with conical moulds, superior fittings, and apparatus complete, price £7 10 0

The same revolver, highly finished and engraved, in mahogany case, with best apparatus £8 8 0

Excellent self-acting revolvers, of various sizes, for the holster, the belt, the pocket, or house defence, with cases and apparatus, from five guineas. Holsters, belts, pouches, &c., for the above may be obtained from the exhibitors.



[2596]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Models of ambulances.

[2597]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Models of 12-pounder Armstrong gun, carriage and limber, forge waggon, rocket carriage, &c.

[2598]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Model of ballistic gun and pendulum.

[2599]

SECRETARY OF STATE FOR WAR, *War Office, London*.—Armstrong rifled 100-pounder cannon.

[2600]

SECRETARY OF STATE FOR WAR, *War Office, London, Royal Carriage Department*.—Armstrong guns; carriage and slide for naval service; travelling, boat, and field carriages.

[2601]

SECRETARY OF STATE FOR WAR, *War Office, London, Royal Gun Factories*.—Rifled ordnance and their details, tools, gauges, and drawings of machinery.

[2602]

SECRETARY OF STATE FOR WAR, *War Office, London, Royal Laboratory*.—Cartridges, fuzes, projectiles, tubes, &c.

[2603]

SECRETARY OF STATE FOR WAR, *War Office, London, Royal Small Arms Factory*.—Specimens illustrating the manufacture of the Enfield rifle and small arms, &c.

[2604]

SECRETARY OF STATE FOR WAR, *War Office, London, Chemist*.—Fuses to be fired by magneto-electricity and electro-magnetism.

[2605]

SMITH, GEORGE, 40 *Davies Street, Berkeley Square*.—Sporting guns and rifles.

<p>This exhibitor was for many years in the well-known establishment of J. Purdey. He holds the office of honorary armourer to the National Rifle Association.</p>	<p>His improved breech-loading double-barrelled rifle for deer-stalking has no superior in power and correctness.</p>
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[2606]

SYLVEN, THOMAS, 33 *Leicester Square*.—A muzzle-loader altered to breech-loader; barrels and action; breech-loading gun.

[2607]

TREEBY, TWY, 1 *Westbourne Terrace Villas, Paddington, W.*—Self-indicating target, saves the lead, and requires no marker.

[2608]

TRULOCK & HARRISS, 9 *Dawson Street, Dublin*.—Breech and muzzle-loading sporting guns and rifles, single and double.

[2609]

TYLER, CAPT., Royal Engineers, *Hampton Court*.—Sheet iron gabion, prepared and sent to Chatham in August, 1853.

[2610]

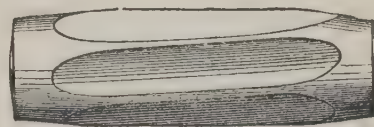
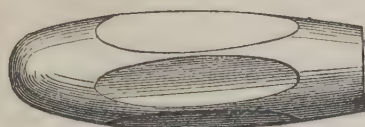
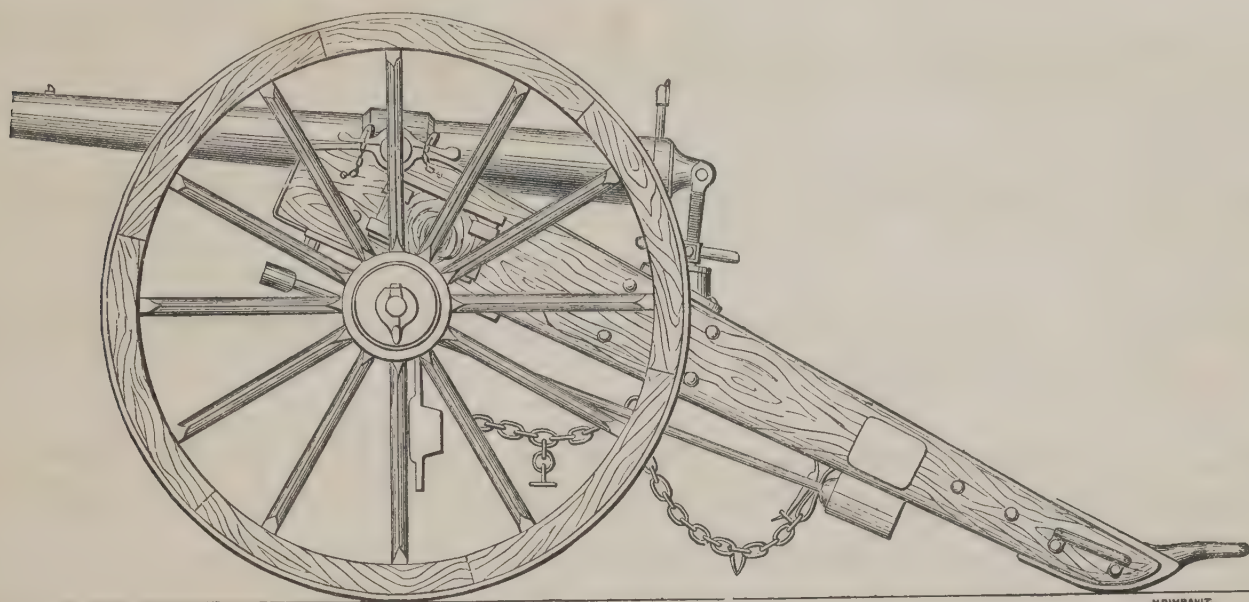
VALLANCE, PHILIP, 4 *Bolton Road, St. John's Wood*.—Telescopic rifle sights.

[2611]

WHITE, TIMOTHY, *Portsmouth*.—Patent portable barracks and buildings; improved system of bedding. Prize medal, Paris, 1855.

[2612]

WHITWORTH RIFLE AND ORDNANCE COMPANY, *Sackville Street, Manchester.*—Rifled ordnance, gun carriages, small arms, and ammunition.



THE WHITWORTH ORDNANCE COMPANY, *Sackville Street, Manchester*, sole manufacturers of the Whitworth Ordnance, exhibit rifled ordnance, ranging in size from the 1-pounder to the 70-pounder gun—

1-pounder muzzle-loading rifled cannon, mounted on carriage.

6-pounder, ditto, ditto.

6-pounder breech-loading rifled cannon, without carriage.

12-pounder brass rifled field piece.

32-pounder rifled ship's cannon.

70-pounder, ditto.

Projectiles of various weights, solid shot, and shell of all sizes from 1-pounder to 70-pounder.

One of the flat-fronted projectiles which were fired through the armour plates and side of the *Trusty* during official trials at the Nore.

The bores of all these cannon are hexagonal in the cross section.

Rifling.—The pitch is in all cases equal to 20 times the diameter of bore.

Material of cannon may be steel-iron, brass, wrought or cast iron; but one of the two first-mentioned metals is preferred.

Projectiles.—Solid projectiles are usually cast, and then planed. One man will mould 200 of the 12-lb. shot per day; one man can plane the same number per day; or the projectiles can be cast so as not to require planing. Hollow shot are treated in a similar manner, and then filled in the same manner as the ordinary spherical shells. No special fuse is required, as the flash of the explosion ignites a fuse in the front, placed and used like the ordinary simple time fuse.

Ranges.—The average ranges obtained from the 12-pounder rifled cannon, with a 12-lb. shot and $1\frac{1}{4}$ lbs. powder, are at point blank 380 yards; at 1° , 900 yards; at 5° , 2,600 yards; at 10° , 4,500 yards; at 20° , 7,000 yards; at 35° , 10,000 yards, or nearly 6 English miles.

The charge of powder usually employed is equal in weight to one-sixth the weight of shot.

Penetration through iron armour-plates has been in all cases successfully effected, when hard metal flat-fronted shot have been used. As a general rule, the calibre of the guns employed should be slightly in excess of the thickness of metal to be pierced, and they will then send their hard metal flat-fronted projectiles through armour-plates of forged or rolled wrought iron placed either upright or inclined to the perpendicular. Flat-fronted projectiles may be made to pass through water to a considerable distance, and they will then retain great penetrating power.

The drill of the gunners with the rifled muzzle-loading cannon is similar to that practised for the smooth-bore cannon.

The Whitworth cannon is equally applicable for the use of solid shot, hollow shot, shell, tubular and flat-fronted shot.

The *tangent back-sight* is elevated by a rack and pinion, the latter having a micrometer wheel for finer readings than the divisions on the tangent stem allow.

Gun Carriages.—These are made of the simplest form of construction, and of the fewest number of parts; so that they may be constructed wholly by ordinary machinery.

THE WHITWORTH RIFLE COMPANY, *Sackville Street, Manchester*, are the manufacturers of the Whitworth rifles, a case of which is exhibited, containing sporting and military rifles of various weights and lengths.

The bore is hexagonal, being 45" measured across the flats, and 49" across the corners of the hexagon. The pitch, or rifling turn, is one in 20 inches.

The average figure of merit at 500 yards is four inches.

The cartridges contain the powder charge, lubricating wad, and projectile, arranged in proper order, so as to be pushed down into the barrel by the ramrod at one operation, and without reversing the cartridge.

The *front-sight* can be moved across the barrel by screw, and the slide of the *back-sight* is raised and adjusted with great nicety by means of a double-acting rack and pinion.

[2613]

WILKINSON & SON, 27 *Pall Mall*.—Best guns, rifles, and swords for real service; defensive armour.

[2614]

WILLIAMS, A. H., & BOCCIUS, G., 135 *Fenchurch Street, London*.—Patent percussion cap holder for military, naval, and sporting uses.

[2615]

WOODWARD, JAMES, 64 *St. James's Street, S.W.*—Guns and rifles, muzzle and breech-loading.

[2616]

WOOLLCOMBE, R. W., 14 *St. Jean d'Acre Terrace, Stoke, Devonport*.—Cannon and projectiles for projection with cycloidal rotation.

[2617]

WYLEY, ANDREW, 21 *Barker Street, Handsworth, Birmingham, and Rose Lodge, Belfast*.—Patent automatic breech-loader, self-cocking, self-capping, using any ammunition.

The breech B has a more or less conical lip entering three-quarters of an inch or more, so that escape is impossible. The nipple is placed in the axis of the breech, and usually screwed from inside, with or without a cartridge piercer of steel or platinum. The cock works in a slot in the middle of the stock; there is no tumbler; and the trigger, or, as above shown, a small catch connected to the trigger by a link, engages in bents cut in the circular head of the cock. Owing to the increased leverage, the pull of the trigger is very light, and yet the bents as deep, and the gun as safe, as with the common tumbler lock.

Segments of screw threads project from the breech, on opposite sides, and lock into hollow threads in the breech case A. The last is about twice the length of the breech, and is screwed to the barrel, and fixed by two screws to the break-off D, by which great strength is imparted, while the barrel and breech-case is easily removed for cleaning.

Fig. 4 (half scale) shows part of the priming tube, containing 40 or 50 caps, pushed forward by a spiral spring. The last is outside, and therefore much more effective, acting on the cap-driver by a pin or pins travelling in a slot in the tube. These pins are retained in a transverse slot, while the caps are being dropped down the tube. When filled with caps, the tube is passed up the hole in the stock from the butt end, the projecting pins running in a grove on one side. When the tube is home, it is turned one-quarter round, which frees the pins from the transverse slot, and allows the spring to act; the same motion locking the tube against the butt plate, the flat handle acting as a spring catch to retain it there. When the breech is drawn back in the chamber, by a simple contrivance, the leading cap is reversed, and brought into a position to be taken off by the nipple.

The action of loading is as follows:—The breech being unlocked by striking up the lever, it is drawn away from the barrel. It thus forces back the cock, sliding over the face of the latter, and sweeping out the exploded cap, which falls through the opening F. The nipple then enters a fresh cap, and the breech being brought up by the half-round projection in front of the break-off, naturally swivels upon it as far as the pins (*p*) will permit, into the position shown in Fig. 2; when it may be loaded

alike with cartridge or loose charge. The above is all done by one continuous motion in half a second. The charge being introduced, and the above motion reversed, the gun is ready for firing; when proper cartridges are used, in less than four seconds from the previous discharge, so that a second barrel is almost superfluous.

A most important feature in this gun, distinguishing it from all previous attempts at self-cocking and self-capping, is, that it can be cocked, uncocked, and capped by hand, as easily as the common weapon, so that if its priming arrangement were totally destroyed, it is still a breech-loader of the most perfect kind. The only part liable to fouling is about the rear of the breech, from the cap flash; but as this is quite accessible, it admits of easy cleaning, and the two pins (*p*) being loosened, the breech can be removed. But even if by carelessness allowed to rust ever so much, it does not interfere with the action.

For rapid firing, a stiff paper cartridge is used, as shown in the section, Fig. 1; the ball projects fully two-thirds of its length, and thus expands in the grooves as in a muzzle-loader. The cartridge may be long enough to contain the ball as at V, having, in this case, the lubrication before it. A cartridge like the last is used for shot (*w*). These project from the breech, so as to be easily withdrawn by hand, after firing. (*u*) is a cartridge like the Enfield; but with the paper envelope of the ball continued in front, and enclosing the lubrication (*l*). When it is desirable to use the loose charge, a metal tube is fixed in the breech to supply the place of the thick cartridge.

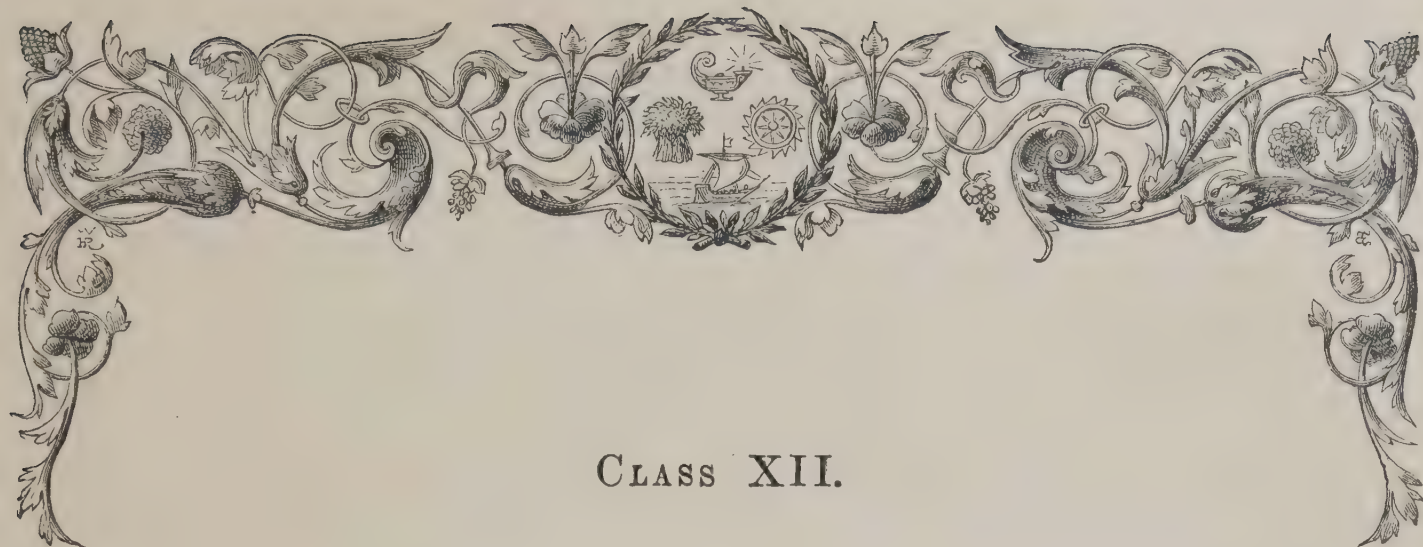
The back sight in rifles, H, Fig. 5, slides vertically in two holes in the front of the cheeks of the breech-case, at the usual distance from the eye. The leaf has a simple traverse, so as to act as wind-gauge. An interchangeable supplementary sight K, for distances up to 2,000 yards, or more, is carried in the fore part of the stock. I, Fig. 2, is a point-blank sight, which can be used without lowering the main sight, in case of a surprise or snap shot. L is a spirit level, which is slid over the legs of the sight for long ranges. In non-military rifles, the foresight is placed on the end of a blade spring, and retracts within a strong sheath. A fine sight is thus less liable to injury from rough usage, or the common practice of leaning the gun against a wall.

WYLEY, ANDREW—*continued.*

A line or spot of white enamel is inlaid in the fore-sight, bisecting it, however clumsy; at the same time, rendering it distinct against a dark object, or in certain positions, when the ordinary sight would be quite invisible. This will be found a great improvement on the ivory fore-sight, the advantages of which are so well known to all who have hunted in South Africa. For night shooting, a larger surface of enamel is used, and a broad line of the same in the back sight.

The cleaning-rod is made with a number of india-rubber washers, let into annular grooves in a wooden or metallic head, and projecting somewhat beyond it, so as to catch and retain the fouling. It can be used as a ramrod for loading at the muzzle.

The inconvenient balance of the military arm, with the sling attached in front of the guard, is well known. To obviate this, the sling is attached to the scroll or steadying-piece C, placed behind the guard, by a pin, travelling in a slot in the scroll. An opening in the sling N allows it to slip over the guard, and to be drawn tight along the wood of the stock. The barrel is fastened tightly in the stock by a plan which dispenses with the unsightly bands, and yet allows for difference of expansion; and there are many other improvements in detail, which there is not space to particularise; but the above hurried descriptions will enable those conversant with the subject to judge how far this arm fulfils the conditions of a perfect breech-loader.



CLASS XII.

NAVAL ARCHITECTURE, SHIPS' TACKLE, &c.

SUB-CLASS A.—*Ship Building for purposes of War and Commerce.*

[2646]

ASTON, JAMES J., 4 *Middle Temple Lane, London*.—Working model boat, fitted with Aston's patent disc propeller.

[2647]

AYLIN, J., R.N., *Wilton, near Brough, Yorkshire*.—Wedge-armed anchor, shackle, &c.

[2648]

BASIRE, JAMES, 4 *King Street, Westminster*.—Models of Brown and Harfield's patent capstans, and C. Langley's unsinkable ship. (*See page 2.*)

[2649]

BETHELL, JOHN, 38 *King William Street, London, E.C.*—Models of a new mode of building ships.

[2650]

BROWNING, HENRY, *Avon Cottage, Clifton Wood, Bristol*.—Patent composition for the preservation of ship's bottoms against the action of water or atmosphere.

[2651]

BURDEN, WILLIAM, *Hay Well, Great Malvern*.—Oblique paddle-wheel, without back lift, illustrating a new theory of motion.

[2652]

BURNETT, CHARLES J., *Edinburgh*.—Fan propellers, with shields and accompaniments.

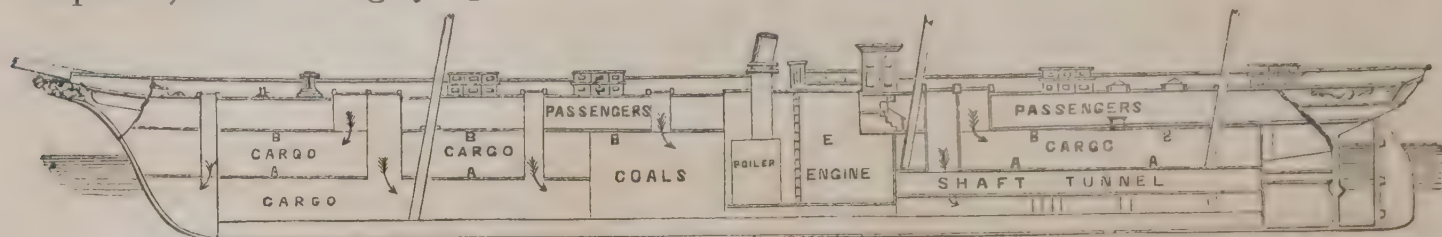
The models exhibited are illustrative of improved steam ship propellers, with diagonal shields, offered to Admiralty 16th August, 1860. The current of water driven out centrifugally by a fan (or screw) is deflected into a straight line, by unhinging on a diagonal surface. An amount of power is thus rendered available

for propulsion, which would otherwise be, and in the ordinary screw propellers is, lost, or worse than lost, in consequence of its action on unequal, constantly varying masses of water below and above it, the unequal resistance of which strains and shakes both screw axle and ship.

[2653]

CAIRD & Co., *Greenock*.—Models of steam-ships and marine engines. (*See page 3.*)

BASIRE, JAMES, 4 *King Street, Westminster*.—Models of Brown and Harfield's patent capstans, and C. Lungley's patent unsinkable ship.



No. 1. Model of unsinkable and fireproof ship "Briton," belonging to Union Steam Ship Company, built by, and upon the plan patented by, Mr. Charles Lungley, of Deptford Green Dockyard.

No. 2. Longitudinal section of same, with fittings, showing how the invention may be applied to all ships. The lower deck, marked A, is made of iron, water-tight, and fitted with water-tight trunks, to communicate with the upper deck, so that access can be had at all times distinct from the other decks. By this plan, if the vessel's bottom is torn out, the water can only get into the space under the lower deck, the trunks preventing it going into the other holds. The deck, marked B, is also made of iron, as well as the trunks. These decks give the means of fitting iron storerooms and divisions for other purposes; and the more fittings put in, the more secure is the ship against fire or combustion, which is localised. E is engine and boiler space, which is inclosed by iron walls, so that if water gains access it is confined, and can be pumped out by separate pumps. The model is made to show the principle of the invention, which can be adapted to every kind of merchant, transport, or war ship.

No. 3. Model of river steamer, with paddles, the invention of James Basire. These wheels have shown the following results, as compared with the ordinary wheels—18 per cent. greater speed, and wheels with feathering floats—16 per cent. greater speed. The rims form a series of continuous floats, each being at such an angle as will best free the water from them. They are less liable to get out of order, and form less resistance to the atmosphere. This model has been saturated and coated with the zopissa composition, for preserving iron and wooden ships against rust and decay, invented by N. C. Szerelmy. (See Class X.)

No. 4 is model of Messrs. Miller and Knill's, of 39 Pudding Lane, City, patent marine steam governor. This invention is intended to supply a want that has been long felt in the merchant steam navy, especially in screw steamers, in providing them with a cheap, simple, and effective governor; and although there are several descriptions in use, they are all more or less complicated and expensive. It is well known where a steamship is in a heavy sea, that there is great danger to the engines, when by the motion of the ship the screw is only partly immersed, and the speed of the engine is greatly increased. This governor has now been in use some time, and with the most favourable results, as the annexed will show:—

"Dundee, Perth, and London

"Shipping Company's Office,

"Dundee, 8th February, 1862.

"I hereby certify that this company's screw steam ship 'Queen' was fitted with Miller and Knill's 'Patent Marine Governor,' in March last; that she has since been employed in the Mediterranean and coasting trades, and that it has been found to answer the purpose it was intended to serve so well, that they have resolved to supply their other steamers with it as soon as possible.

"The 'governor' prevents the engines from racing in heavy weather, lessens the risk of a 'breakdown,' and allows them to be driven at greater speed with safety, so that the vessel now makes her passages in less time and with less consumption of fuel than formerly.

(Signed)

"THOS. COUPER, Manager."

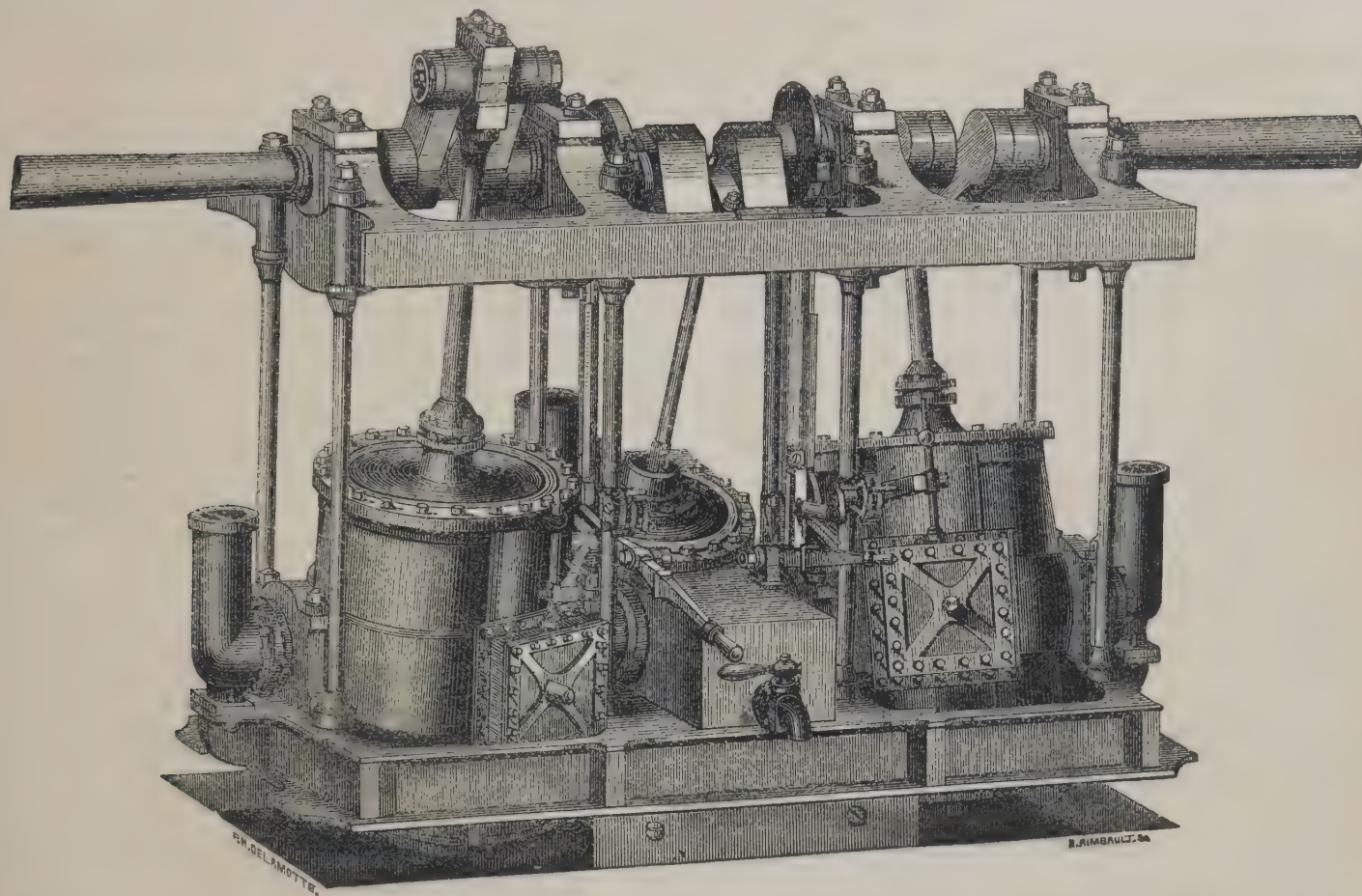
No. 5. Soul's engine-room telegraph, as now fitting in the British navy. It is not uncommon to see the signals on the dial of a telegraph, arranged altogether at variance with the condition of the engines. An engine moving full speed ahead has to pass in succession, and sometimes rapidly, through all the different degrees of speed, and even to stop, before it can commence a retrograde motion. And again, in moving backwards, it has to pass in the same order through the different periods, before it can be brought to advance. An arrangement of signals is



therefore required and provided by this telegraph to correspond with similar conditions. The attention of the engineer is directed to the telegraph dial by the sound of the alarum. On seeing a retrograde direction of the hand, he knows at once that the speed has to be slackened; he follows the degree indicated successively by the telegraph with the starting lever or wheel until the hand comes to a stop. It is therefore evident, that the hand upon the dial has to pass through the same degrees as the starting lever or wheel of the engine. The motion of the handle on deck is transmitted as usual, by means of a series of shaftings and tooth-wheels, where such are necessary. The alarum hammer is directly attached to a spring, and is acted upon by a wheel having on its circumference a series of evolute cogs or projections, the same in number as there are signals upon the dial. To insure a quick release of the hammer, in order that such may strike the bell effectively, a peculiarly shaped cam is mounted upon it, which, after being raised by the before-mentioned wheel to the extent requisite, allows the alarum hammer to fall, and re-act, without meeting any hindrance which might impede its free action, should the wheel not be moved quick enough. Mr. Soul's invention dispenses, it will be readily seen, with the use of several springs and hammers, without diminishing the number of signals required. There is this to recommend it—easy adjustment of working parts, and the reduction of the whole mechanism to a form more simple than any now in actual use.

No. 6. New system of slide valve for marine and land engines, locomotives, &c. Invented and patented by E. Plainemaison, Engineer of the North of France Railway Company. Agents: H. P. Burt & Co., 2 Charlotte Row, City. The object of this invention is to reduce the pressure of steam upon the working parts of the slide valve, thereby greatly diminishing the friction and wear and tear, and greatly increasing the facility of reversing the gear.

CAIRD & Co., *Greenock.*—Models of steam-ships and marine engines.



The following are the descriptions of the models exhibited :—

1st. A small model in steel to a $\frac{1}{4}$ -inch scale of a pair of oscillating engines, of 160 horse-power collectively, suitable for merchant paddle steamers of any size.

2nd. A small model in steel to a $\frac{1}{4}$ -inch scale of a pair of inverted cylinder direct acting engines, of 400 horse-power collectively (originally designed by J. T. Caird, Greenock), suitable for merchant screw steamers of any size.

3rd. A pair of horizontal direct acting screw engines,

of 10 horse-power collectively, fitted with improved variable expansion gear. Engines of this class are suitable for war vessels of any size.

4th. A model to a $\frac{1}{4}$ -inch scale of Royal Mail Company's steam-ship "Atrato," built, engined, and equipped complete, by Caird and Co., 1853. Gross tonnage = 3,466.

5th. A model to a $\frac{1}{4}$ -inch scale of the North German Lloyd's screw steam-ship "Hansa," built, engined, and equipped complete, by Caird and Co., 1861. Gross tonnage = 2,991.

[2654]

CALLEY, SAMUEL, *Brixham, Devon.*—Ship's worn sheathing; patent compositions for metals and wood; metallic paints, ochres, &c.

The exhibitor manufactures patent composition for ships' metal sheathing, iron ships, iron, wood, and other surfaces; and also the celebrated Torbay iron

ore and metallic paints, and mineral ochres. Prices and testimonials may be obtained on application at the works.

[2655]

CAMPBELL, ROBERT F., *8 Brook Street, Hyde Park.*—Apparatus for management of vessels. New mechanical motion.

[2656]

CARR, THOMAS, *New Ferry, near Birkenhead.*—Models of two patent steering apparatuses.

[2657]

CLAY, JOHN, *82 Castle Street, Edgeley.*—Ship and propellers.

[2658]

CLIBBETT, WILLIAM, *Appledore, Devon.*—Half model of barque.

CLIFFORD, CHARLES, 49 *Fenchurch Street, and Temple*.—Improved systems of unlashing, lowering, and releasing ships' boats, from vessels stationary or under weigh, without possibility of canting, by one of the crew sitting in the boat.

"The means of lowering boats evenly, and of readily disengaging the tackles, are *desiderata* wanting throughout the naval service."—Parliamentary Report on the Loss of the *Amazon*, 1852.

Upwards of 1,500 boats have been fitted on this system, 350 being for the Royal Navy.



The third "MAN OVERBOARD" picked up during the first voyage of H.M.S. *Shannon* (under Captain Sir William Peel, V.C.), through the celerity with which boats were lowered by Clifford's gear; ship under full sail.

Captain Vaughan, C.B., says:—"I was below, at the mess-room table, when I heard the cry of 'Man overboard;' but in three minutes from that time the boat was manned, lowered, and the man picked up. I lowered the boat myself, single-handed."

Of the various forms of fatal accidents to which mankind is liable, drowning in sea voyages is in by far the largest proportion. The majority of instances of sailors and others falling overboard, and lost before help can reach them, either never come to our knowledge, or pass unheeded in the crowd of events that daily press upon our notice.

It requires a catastrophe like the loss of the *Amazon*, or the *Birkenhead*, the *Queen Victoria*, the *Austria*, the *Pomona*, or the *Royal Charter*, with all its attendant horrors, to bring us to think of and appreciate the perils incident to navigation.

During the space of only a few months of 1859-60, not less than 1,484 persons lost their lives at sea from the destruction of six ships; and it was officially stated that upwards of 1,000 men are annually lost from American ships alone, by falling or being washed overboard, while the numbers lost from British ships are probably equally large.

One of the chief causes of this lamentable loss of life is the want of any means for lowering the boats speedily and safely in case of accident to the ship. On the occasion of the loss of the *Amazon*, the Parliamentary report stated the supply of boats was ample, but "that the means of lowering boats evenly, and readily disengaging the tackles, &c., are *desiderata* wanting throughout the naval service;" and that "it may be expected some useful means for supplying these defects may be devised." Clifford's system accomplishes these *desiderata*, and by it a boat laden with any crew can be instantly and safely lowered, even if the ship is moving rapidly through the water. It has been approved and adopted by the Admiralty, and every naval department of the Government, by the surveyors at Lloyd's Register of British and Foreign Shipping, by the Institution of Civil Engineers, and

most of the leading Steam Companies. After repeated competitive trials, it is the only plan made compulsory in all ships chartered by H.M. Emigration Commissioners, the Council of India, and the Marine Board of Melbourne. The Committee of the Royal National Life Boat Institution, consisting of some of the first naval men of the country, passed a vote of thanks to its inventor on account of the number of lives it has saved, a list of which the Journal of the Institution, Jan. 1862, gives in the following words:—

"We think we shall be rendering a service to the great cause of humanity, by giving every possible publicity to the list of lives saved by this invention, as in most of the instances we record the men have fallen overboard in heavy gales, and when the ship was moving rapidly through the water; the officers in command stating their firm belief that but for it they would have been lost; and also that the lowering and disengaging the boat being the result of the single act of one man only, is the chief cause of its great success. In some cases the entire crews of ships when foundering or wrecked, in collision and suddenly sunk, or on fire, owe their preservation to it. From H.M. ships *Shannon*, *Racoon*, *Princess Royal*, *Archer*, *Trafalgar*, *Emerald*, *Diadem*, *Chesapeake*, *Mersey*, *Calypso*, *Ganges*, 20 men were saved by it. H.M.S. *Perseverance*, from a vessel run into at night, and entirely sunk in less than ten minutes, took off 15 men and 1 boy. From the troop-ships *Lady M'Naghten*, *Australasian*, *John Duncan*, *Dutchman*, *Kate*, *Clara*, 10 men. From ships chartered by H.M. Emigration Commissioners *Commodore Perry*, *Washington Irving*, *Aloe*, *Black Eagle*, *Transatlantic*, *Ebba Brahe*, *Medway*, *Omega*, *Rodney*, *Blundell*, *Admiral Boxer*, *Champion of the Seas*, *Hoogley*, 17 persons (2 being women). From merchant steam ships (Royal

CLIFFORD, CHARLES—continued.

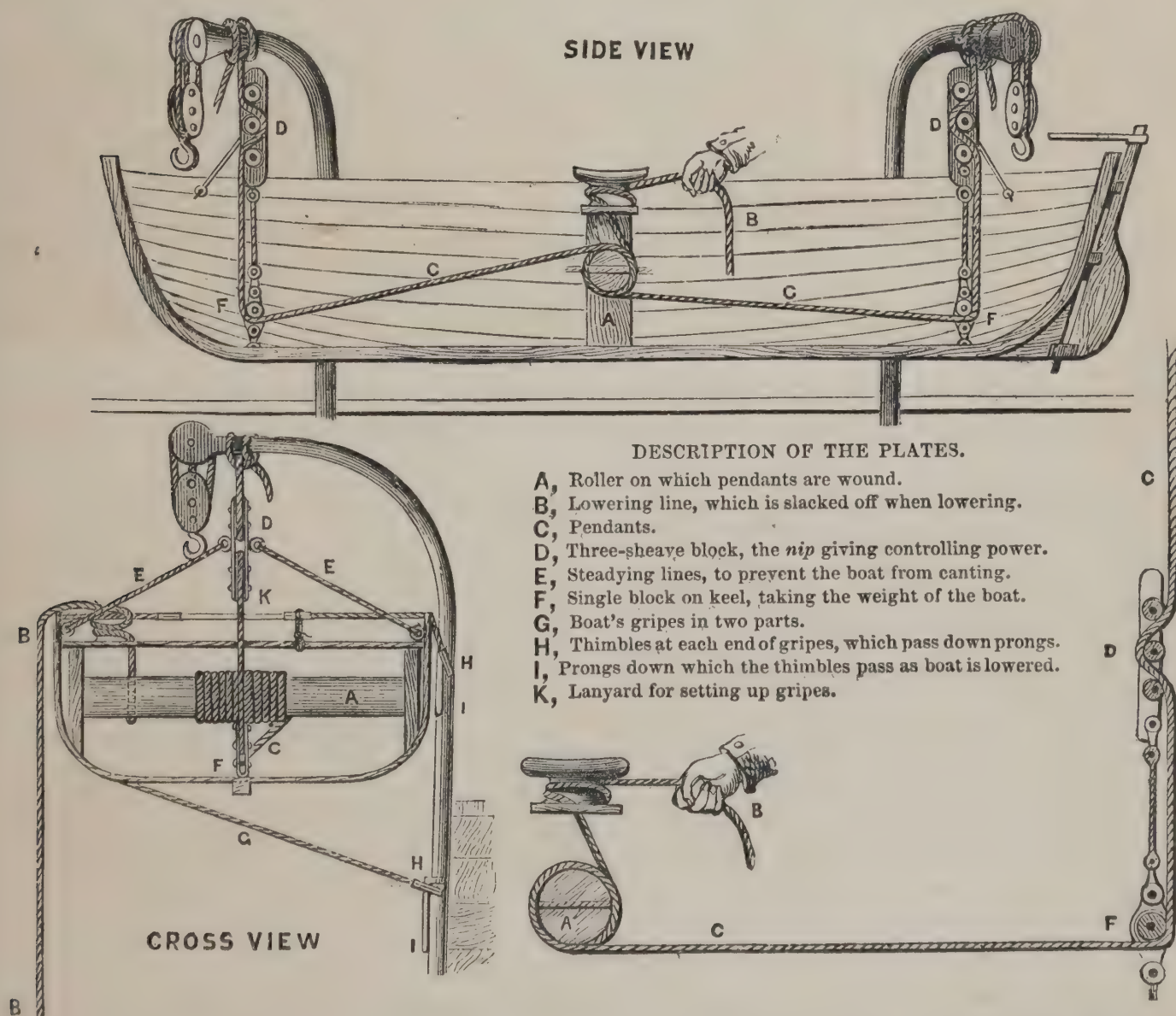
Mail) *Tasmanian, Queen of the South, Duke of Richmond, Duke of Rothsay, Queen*, 8 men. The *John Masterman, Rodney, Merchantman*, by it lowered down their boats and took away the entire crews of three ships that were about foundering at sea, or on fire, and which had lost their own boats when attempting to lower them by the ordinary tackling; by it also, on the memorable occasion of the fire of the troop-ship *Sarah Sands*, 'the life-boats filled with the women and children were lowered in perfect safety,' the *Times*, in its account, stating that 'for once in the case of a conflagration at sea the boats were lowered in safety.' The official report of the chief officer of the *Pomona* to the Board of Trade, when she foundered off Malta, was, that the only people saved, 18 in number (2 being women and 1 a child) 'are indebted to Clifford's lowering apparatus for their lives.' Thus we have certain accounts of more than 100 people being saved, probably not half of what have really occurred."

The committee appointed by Admiralty order to report upon this apparatus, expressed its unanimous conviction

"that no captain, whether in the Queen's or mercantile navy, should be permitted to put to sea without it."—*Times*, Dec. 11, 1856.

In the House of Commons, Admiral Berkeley said "that in every trial which had been made of it, its use had been attended with complete success, and he hoped to see it universally adopted."—*Times*, March 18, 1857.

C. Clifford is prepared to unleash, lower, and entirely disengage from any ship, either stationary, under weigh, or going at any speed, in a gale, or in smooth water, a boat laden with a full crew, against any other invention or crew in the world, for any sum to £100, to be given for placing a life-boat on an exposed part of our coast. As hundreds of our best seamen are annually lost through the want of such means of instantly lowering a boat—which Parliament has decided to be "wanted throughout the naval service"—it is hoped some one will be found with sufficient spirit and humanity practically to test this challenge.



DESCRIPTION OF THE PLATES.

- A, Roller on which pendants are wound.
- B, Lowering line, which is slackened off when lowering.
- C, Pendants.
- D, Three-sheave block, the *nip* giving controlling power.
- E, Steadying lines, to prevent the boat from canting.
- F, Single block on keel, taking the weight of the boat.
- G, Boat's girdles in two parts.
- H, Thimbles at each end of girdles, which pass down prongs.
- I, Prongs down which the thimbles pass as boat is lowered.
- K, Lanyard for setting up girdles.

On slackening off the lowering line B, the roller A revolves, and the pendants CC are unwound evenly as the boat descends into the water, when the pendants being tapered at the ends, overhaul themselves, and the boat is perfectly free. The controlling power is obtained by the blocks DD, which act like a sailor's "turn and a half" in the boat on each pendant; the *nip* of the blocks exists only when they sustain the weight of the boat, and ceases when it reaches the water. This power in the block to decrease the weight of the boat, and thus enabling the man attending the lowering line to control the descent, whatever the weight may be, but yet allowing all to run free the moment the lowering line is let

go, is its chief feature, and that which befits it for the purpose to which it is here applied, and for which it was specially designed.

INSTRUCTIONS FOR LOWERING.—One of the boat's crew takes charge of the lowering line B, and with one round turn on the cleat, slackens it off slowly. The lashings release themselves by the thimbles passing down the prong II. When the boat reaches the water, the lowering line is let go, the pendants overhaul themselves, and the boat is perfectly free.

Thus by this one simple act of the one man, the boat is unleashed, lowered, and released from the ship.

[2660]

COMMISSIONERS OF IRISH LIGHTS.—Fastnet Rock Lighthouse, off Cape Clear, S.C. Ireland.

[2661]

COMMISSIONERS OF NORTHERN LIGHTHOUSES, *Edinburgh*.—Lighthouse apparatus and models.

[2662]

CORPORATION OF TRINITY HOUSE, THE, *London*.—Models of lighthouses, and of a light vessel.

[2663]

COUCHMAN, JOHN WILLIAM, *Tottenham Green, Middlesex*.—1. A model of a new principle of street making. 2. A model of an iron combination bridge. 3. A model of a floating battery.

CONCHMAN'S FLOATING BATTERY.—A design for a 12-gun floating battery by John William Conchman, Engineer; modelled to a scale of 5 feet to 1 inch. The length over all is 150 feet; breadth of beam 38 feet 9 inches; height of main deck, 8 feet at sides. It is intended to be built of oak timber, of ribs in solid order 2 feet thick; the gunways and sides to 2 feet vertically

below water level, to be covered with 3 inch iron plates; and the flush deck with 2 inch ditto, secured with bolts with mushroom-shaped heads of steel 8 inches in diameter. The interior is ventilated through gangways on the flush deck; by apertures at stem and stern; and by the port-holes, which open to the under side of the domed roofs.

[2664]

COULSON, JUKES, & Co., 11 & 12 *Clement's Lane, London, E.C.*, 7 *St. Mary's Row, Birmingham*, and *Queen's Steel Works, Sheffield*.—General ironwork for ships.

[2665]

CUNNINGHAM, HENRY D. P., R.N., *Bury House, near Gosport, Hants*.—Cunningham's patent self-reefing topsail, &c.

By this invention, the topsails can be reefed and unreefed from the deck, without sending any one aloft. It is also applicable to topgallant sails and other sails. This invention is now in use on board several thousand ships belonging to the mercantile marine, and also on board many of H. M. ships; and the old defective and dangerous method of reefing by the men going aloft and out on the yards, is rapidly giving place to the new method. It is computed that many hundreds of lives have been already saved by it.

It has been found that sails wear, at least, one-third longer than on the old plan; ships, too, can be navigated with fewer regular seamen, and, from the ability to make and shorten sail so easily, sail can be carried on longer, thus considerably abridging the duration of the voyage. Ships fitted on the Cunningham system make much quicker voyages than on the old plan.

The model shows some of the various arrangements by which Mr. Cunningham has applied the principle of his invention.

The fore topsail exhibits the yard turned round by the action of the chain topsail tye in which the yard is shown, and fitted for a ship of war with reef lines, &c., in the topsail, to reef in the old plan if required for purposes of exercise.

The main topsail represents the usual mode of fitting the yards of merchant ships.

The mizen topsail represents one of the earliest modes of turning the yard by the action of a wound up rope or band.

The main topgallant sail shows another early mode of fitting, and still in use on board some ships, where the yard is turned by the action of wound up ropes.

Office: G. C. Warden & Co., 12 London Street.

[2666]

DANDO, WILLIAM ELBERT, 29 *Percy Street, Bedford Square*.—Patent apparatus for safely lowering boats at sea.

[2667]

DAY, WILLIAM, & Co., *Bow Road, London, E.*—Patent marine cements and compositions, for coating the insides and outsides of ships.

[2668]

DENNY, WM., BROTHERS, *Dumbarton*.—Sectional model of a screw steamer, in a glass case; models of two screw ships.

[2669]

DUNCAN, ROBERT, 174 *Trongate, Glasgow, and at Bowling*.—Slip cradle or carriage, and self-acting time and tide gauge.

DUNCAN'S SELF-RELIEVING SLIP CRADLE.—An improved method of relieving the cradle from underneath vessels while on slip for repairs; entirely doing away with the raising of vessels by wedge, hydraulic, or other means.

Also, a new method of adjusting bilge blocks on the arms of the cradle; by which the same blocks can fit vessels of almost any shaped bottom.

Robert Duncan, Engineer, 174 *Trongate, Glasgow, and at Bowling, on Clyde.*

[2670]

DUNLOP, DAVID, *Hurlet, Glasgow*.—Angulated invulnerable steam-ram, propelling either way, sweeping enemies from decks by machinery.

[2671]

EDDY, C. W., *Sutton, Loughborough*.—Armour-plated steamers, submarine shell and ram, and other naval inventions.

[2672]

ELIOT, EDWARD J., 7 *Southampton Row, Russell Square, W.C.*—An improved hydraulic apparatus for raising sunken vessels.

[2673]

ELLIS, GEORGE, 4 *Collier Street, N.*—War ships, safety ports.

[2674]

ESCOTT, R. A., *Old Charlton, Kent*.—Sections of guns and shots, showing rifling.

[2675]

FORMBY, ROBERT, *Liverpool*.—Patent apparatus for working ships' pumps by water power.

[2676]

FRYER, F. A., 3 *Leadenhall Street, London*.—Horizontal patent propeller direct-acting steam engines, and steam-steering safety propellers. (*See page 8.*)

[2677]

FULLER, GEO. L., C.E., 69 *Lombard Street, London, E.C.*—Model of floating-ship lift for open waters, Mackelcan's patent.

[2678]

FYFE, T., 46 *Leicester Square*.—Patent rigging; horizontal ship; patent knapsack; method of ventilating ships' holds.

[2679]

GITTINS, RICHARD, 28 *New Street, Dorset Square, London*.—Model of a new invention for propelling steam ships.

[2680]

GRANTHAM, J., 31 *Nicholas Lane, E.C.*—Plan for preserving iron ships from concussions, &c.

[2681]

GRAY, JOHN WILLIAM & SON, 114 *Fenchurch Street, City, and Margaret Street, Linchouse, E.*—Patent engines, patent ship's pumps, anchor dropper, lightning conductor, deck lights, closets, night life buoys, and brass work.

The exhibitors are engineers, and workers in copper and brass, and patentees and manufacturers of the following apparatus, viz.:—

Gray's spherical steam-engine and ordinary engines.

Agricultural and locomotive engines.

Spherical and other pumps.

Ship's side ports, with lifting and securing apparatus.

Deck illuminators and ventilators.

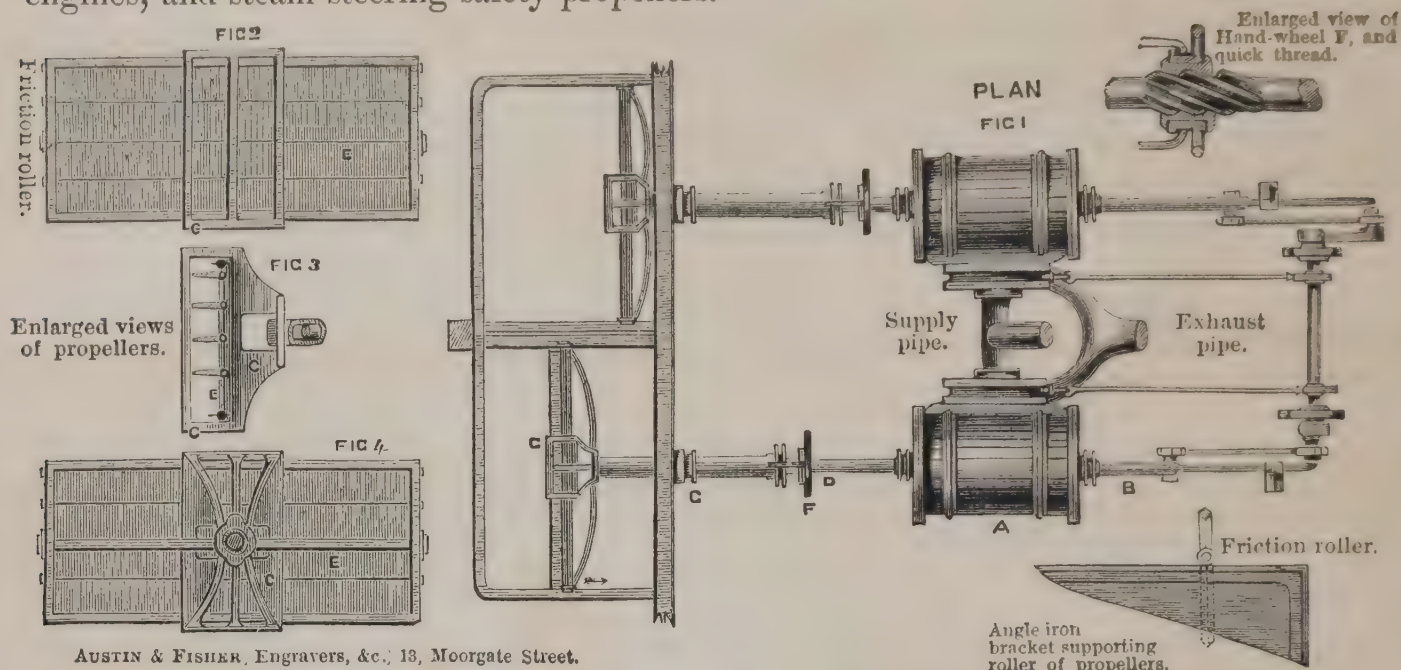
Portable fire-engines; patent anchor stoppers.

Apparatus for distilling sea-water; steam gauges and fittings.

Signal lanterns; ship's cooking apparatus; engineers' tools, &c.

They are also agents for Sir W. Snow Harris' patent lightning conductors, as applied in the royal navy; for Hosmer's patent self-acting house and street cleaning apparatus; and for Grimaldi's patent revolving steam-boilers for ship and land purposes. These boilers possess six times the evaporating power of ordinary boilers.

FRYER, F. A., 3 Leadenhall Street, London.—Horizontal patent propeller direct-acting steam engines, and steam-steering safety propellers.



The stroke of propellers can be multiplied by mechanical contrivances.

The above engraving represents Fryer's patent marine steam propellers. Fig. 1 is a plan of the general arrangement of the machinery. Fig. 2 a front view. Fig. 3 a section, and Fig. 4 a back view of the propeller. A the cylinder. B the piston rod, giving direct motion to the propeller through stuffing box C. D shows a quick thread worm for reversing the propeller E, by means of the hand wheel at F. G the frame supporting the floats when making the forward stroke; in making the backward stroke, the floats turn edgewise, offering little resistance to the water. The arrow shows the direction in which the propellers are supposed to be moving.

FRYER'S HORIZONTAL PATENT PROPELLER DIRECT-ACTING STEAM ENGINES, STEAM STEERING SAFETY AND LEVER PROPELLERS.—These new propellers and steam engines combine so many valuable properties with admirable simplicity, that it is hoped they will commend themselves to the mercantile community and the shipping interest in such a manner as to give full development to the wonderful power of steam, both for the speed, safety, convenience, and economy of vessels and canal boats. The inventor has long deplored that so mighty an agent for steering vessels with security, even in a storm, should never before have been employed, notwithstanding the enormous annual loss of lives and property.

Among many advantages may be enumerated the following:—

Economy.—It is calculated that the cost of these engines and propellers, where so much superfluous machinery is entirely abolished, will not much exceed half of those now in use, both for screw and paddle-wheel steamers; this, therefore, is a consideration of the very first importance, in addition to which, there is a considerable saving in fuel, and the facility for working the steam expansively, from the proximity of the cylinders.

Space.—The diameter of the cylinder or cylinders represent the amount of space required for these engines, both in height and width; and being fastened on a bed plate close to the keel of the vessel, are always considerably below the load water mark, besides being perfectly protected from shot, shell, &c.

Speed.—From the immense propelling power brought to bear in a direct manner upon the water, the opinions of several practical engineers have been given, that twenty-five statute miles per hour can be attained. There is also very little resistance given on the return stroke of the propellers.

Steam Steering.—Particular attention is invited to this part of the invention, as showing an entirely novel application of steam power, by means of which its full power can be concentrated at any moment on either side of the bow or stern of the vessel, so as, in two or three minutes, to turn her completely round on her centre, without the use of the rudder; an invaluable power to a vessel in a storm, as thereby she can turn her head to the wind, and thus make for the open sea. The want of this power has been seriously felt by the "Great Eastern," on the occasion of a recent voyage to America, in a peculiarly disagreeable manner.

General Remarks.—It is surprising that, after the lapse of so many years since the introduction of steam vessels, so few as about 2,000 only should be registered in the United Kingdom, against upwards of 34,000 sailing vessels to the present date, as shown by the official lists; thereby proving the immense scope there exists for the introduction of steam into vessels of every class, including collier vessels and canal boats, and to which the merits of this invention, it is hoped, will greatly tend. The propellers being entirely under water, are not exposed to the violence of the waves as paddle wheels or the screw propeller is, nor can it foul as the latter does. These engines also act as ballast; they can be constructed of any strength, and are equally applicable for canal boats as ocean steamers. There are many other advantages in connection with this patent; and in consequence of the magnitude of the subject, the patentee purposes granting licenses to responsible parties for working the same in the most liberal spirit. All communications on the subject to be addressed to the under-mentioned, who will forward detailed circulars and tracings of the drawings.

Frederick A. Fryer, sole agent for the patentee, 3 Leadenhall Street, London, E.C.

Modellists: Messrs. Lewis & Sons, 5 Wych Street, Strand, London, W.C.

[2682]

GREEN, MESSRS. RICHARD & HENRY, *Blackwall Yard*.—Models of a 51-gun screw frigate; a clipper ship; boat-lowering apparatus, &c.

[2683]

GRIFFITHS, ROBERT, 69 *Mornington Road, London*.—Two screw propellers, and a model of a frigate, with portable armour-plates. (*See pages 10, 11.*)

[2684]

HALE, WILLIAM, 6 *John Street, Adelphi*.—Gun and rocket boat, with apparatus attached for firing Hale's rockets.

[2685]

HALL, ROBERT, 37 *Princes Stairs, Rotherhithe*, and 58 *Paradise Street, S.E.*—Ship's figure head.



The exhibitor designs and carves all descriptions of shields, crests, and other heraldic decorations, from figures, ornaments, &c., for the decoration of ships, authentic drawings. The specimen exhibited is the public buildings, &c. He executes, in all kinds of wood, figure head of the "Algerine."

[2686]

HALL, J. & J., *Arbroath and Dundee*.—Half model of vessel.

[2687]

HEWITT, WILLIAM, 3 *Brislington Crescent, Bristol*.—Feathering screw propeller.

[2688]

HIGGINS, ARTHUR, 10 *St. Vincent's Parade, Clifton*.—A trader for narrow rivers, with new arrangement of rudder.

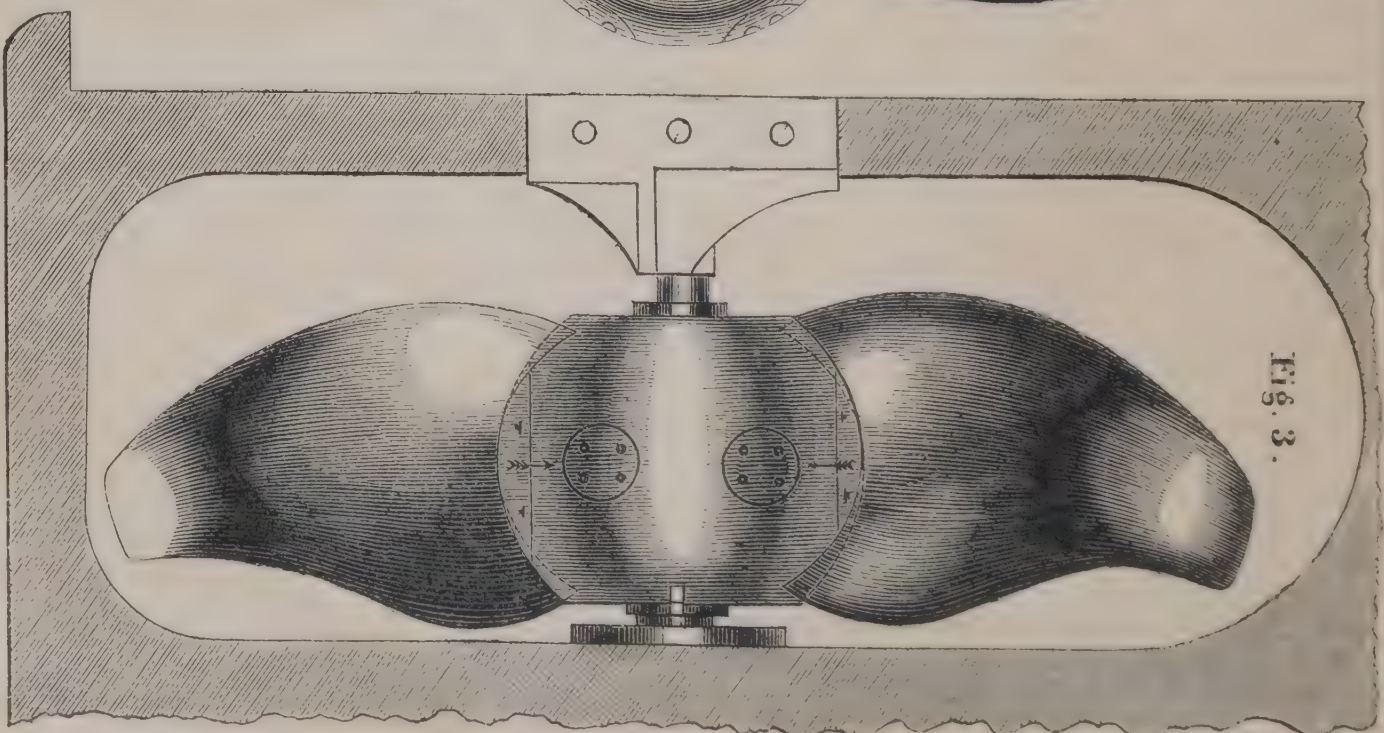
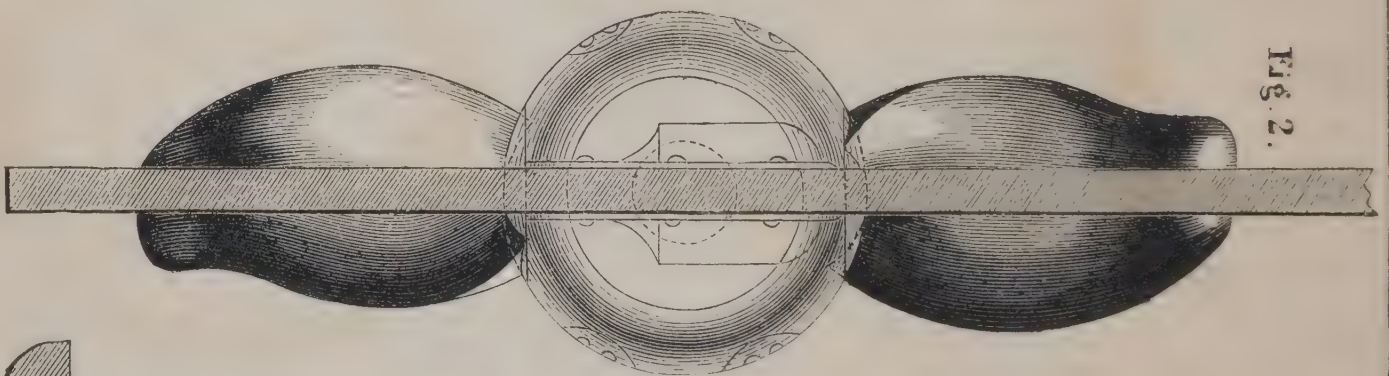
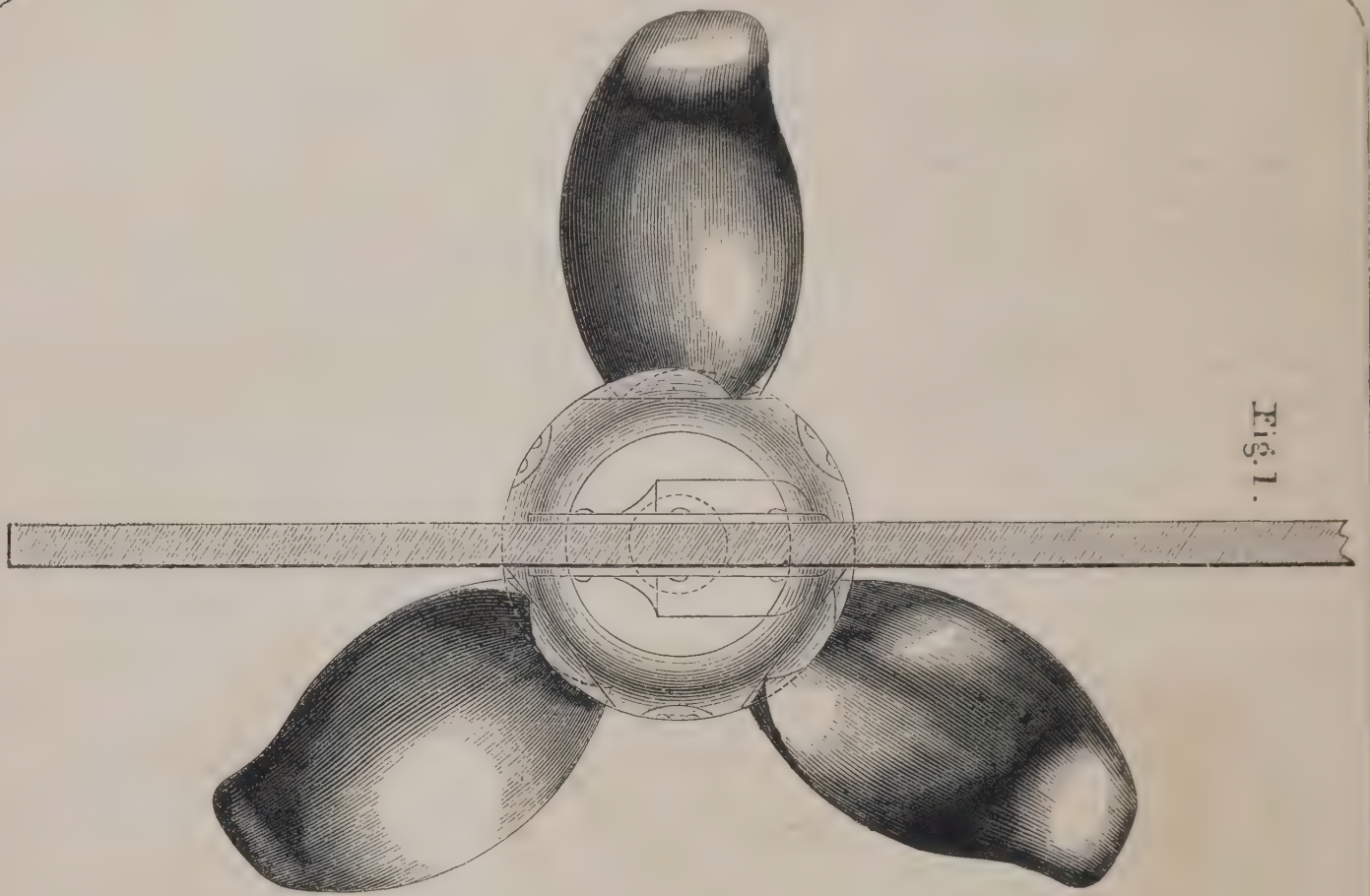
[2689]

HORNSEY, WILLIAM, *West Front, Southampton*.—Patent marine engine room, telegraphs and gongs. (*See page 11.*)

[2690]

IMRAY, JOHN, *Bridge Road, Lambeth*.—Hirsch's patent propeller, with boss for altering pitch. (*See page 12.*)

GRIFFITHS, ROBERT, 69 *Mornington Road, London*.—Two screw propellers, and a model of frigate, with portable armour-plates.



GRIFFITHS, ROBERT—*continued.*

Griffiths's Improved Patent Screw Propeller, patent 319, Feb. 20th, 1858.

Fig. 1, end view of a three-bladed screw propeller.

Figs. 2 and 3, side and end view of a two-bladed screw propeller.

LIST OF PRICES:—

All sizes of two-blade propellers in iron, complete, with centre bored ready for keying on screw shaft, from 7 feet diameter to 14 feet inclusive, price 15s. 6d. per foot, calculating on square of the diameter of the propeller. Thus a screw, of 10 feet diameter, will amount to £77 10s.

For all sizes of propellers, above 14 feet diameter, 20s. per foot. Screw propellers with three blades will be 25 per cent. above the price of two-bladed propellers.

Spare or extra blades one-sixth the cost of screw for each for two-bladed propellers, and one-eighth for three-bladed propellers. All screw propellers having their blades fixed to the boss for extra security, with gun-metal bolts and nuts, $7\frac{1}{2}$ per cent. on the above price.

Gun-metal screw propellers, of all sizes, at per lb., varying according to the state of the metal market.

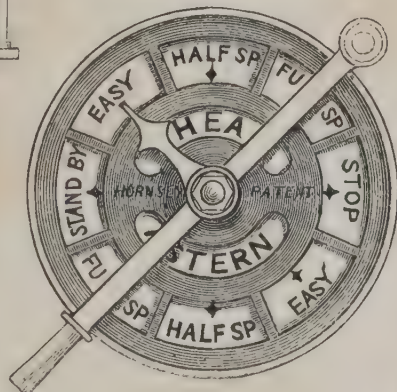
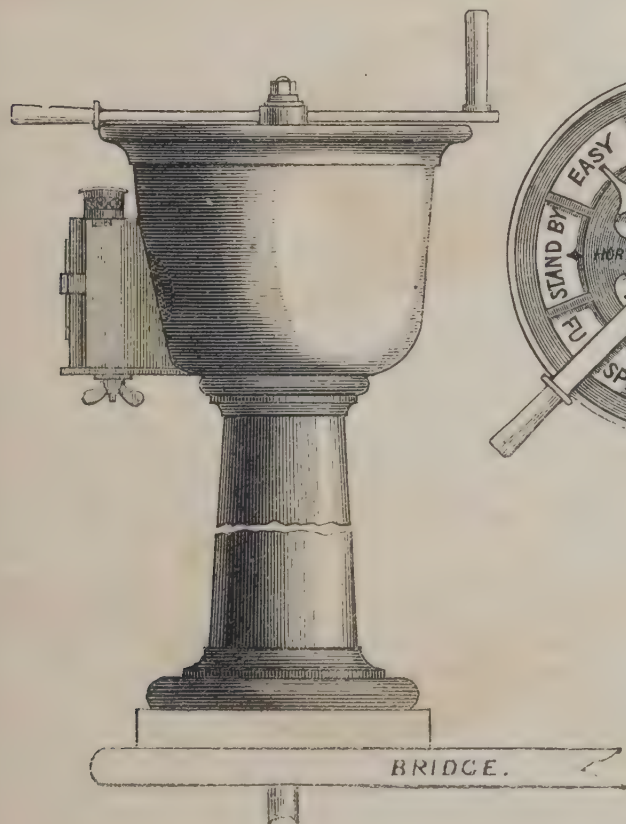
Patent right, 5s. per nominal horse-power of engines.

Patent Screw Propeller Manufactory, London Works, near Birmingham.

London Address, 69, Mornington Road, N.W.

A model of a frigate, with portable armour plates, by Robert Griffiths; scale, $\frac{1}{4}$ -inch to a foot.

HORNSEY, WILLIAM, *West Front, Southampton.*—Patent marine engine-room telegraphs and gongs.



These telegraphs were selected as the standard for the Royal Navy in 1858, by Captain Halstead.

They have been supplied and fixed by the patentee to several of Her Majesty's line-of-battle ships and frigates, and the steam ram "Defence," and are extensively adopted by mercantile and Royal Mail steamers.

The engine-room dial being fixed in the engine-room, within view of the starting gear, is connected by shafting

and bevil-wheels to the brass columns on the bridge. The dial on the top of the columns is divided in the same manner as the engine-room dial, and glazed with embossed glass segments for illuminating at night. A gong in the interior of the apparatus in the engine-room is sounded at every move of the pointer, which cannot move from one division to another in either direction without attracting the attention of the engineer by striking the gong.

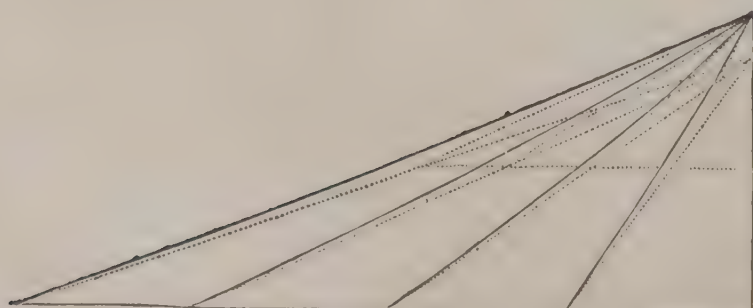
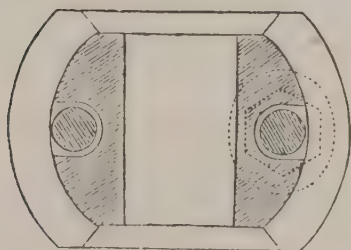
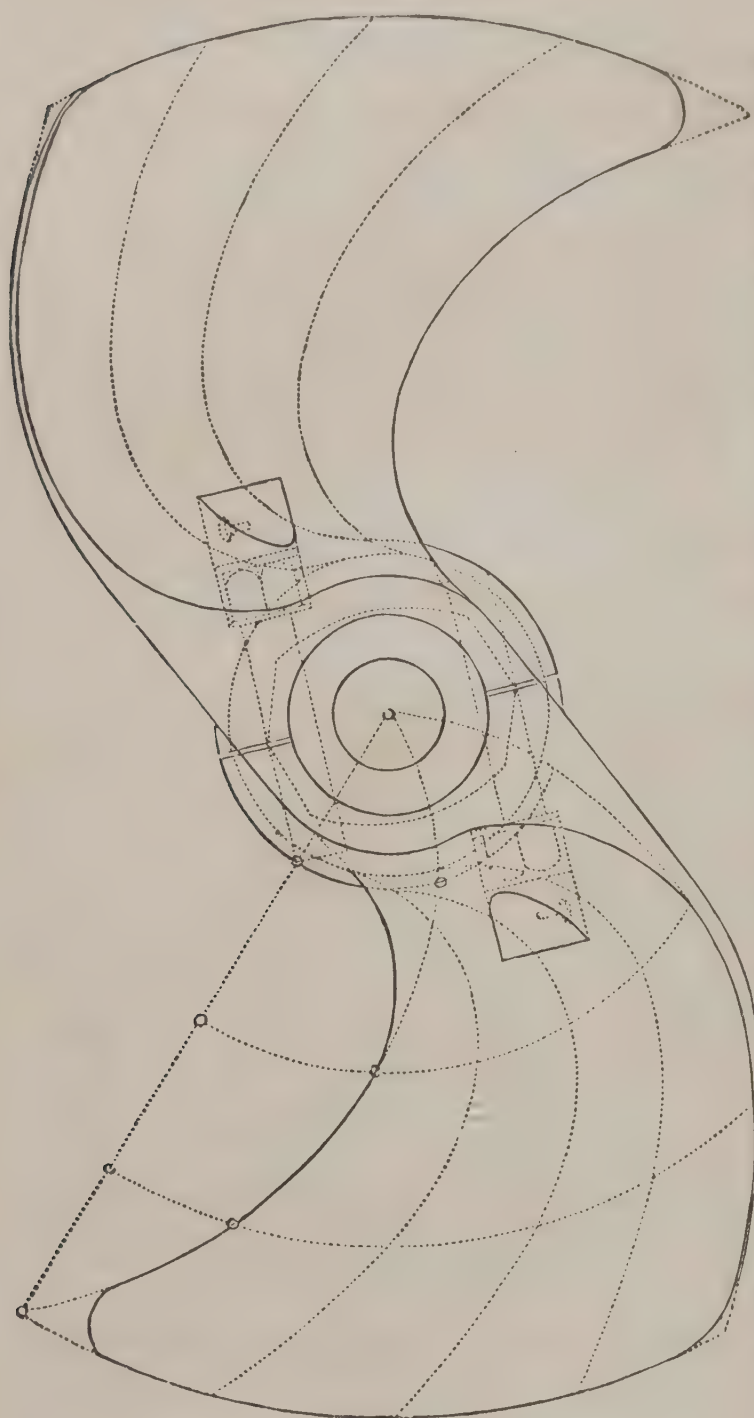
[2691]

JAMIESON, ROBERT, C.E., *Glasgow.*—Preservative compositions for coating and permeating materials for marine architectural purposes.

[2692]

JECKS, ISAAC, *Great Yarmouth.*—Ship with iron passage, to allow missiles to pass entirely through her.

IMRAY, JOHN, *Bridge Road, Lambeth*.—Hirsch's patent propeller, with boss for altering pitch.



The blades of this new propeller are curved in such a manner as to secure certain advantages and avoid certain evils.

The object of a propeller being to convert the rotatory motion of its surface into a pressure directed in the line of its axis, that is the best propeller which converts a given rotatory power into the greatest longitudinal pressure, consistently with facility of steering and absence of vibration. The extent to which these objects are attained by Hirsch's propeller may be best understood by comparing it with an ordinary straight-bladed screw, the form of propeller found best until Hirsch's propeller was tried.

The *slip* of a screw represents the yielding of the fluid medium, the resistance of the fluid to this yielding being a measure of the propelling force. When all this force is applied at once, the water suddenly put in motion at the front edge is scarcely acted on by the rest of the blade. In Hirsch's propeller the front or entering edge is so inclined that it cuts the unbroken water with little or no resistance, and the rest of the blade is more and more inclined, so as to give the water a gradually increasing motion, and to maintain a uniform reactive pressure from unbroken water over its whole breadth.

The straight-bladed screw acts like a fanner, not only driving the water backwards, but also throwing it outwards; in the resulting oblique action it loses much of its effect in propelling the vessel, and by breaking the backwater and causing a great divergence and eddying in its streams, it deprives the rudder of much of its power. In Hirsch's propeller the blades are curved inwards, so as to drive the water in an unbroken column directly astern. The reaction of the water is thus entirely expended in direct forward propulsion, and the influence of the rudder, surrounded and acted on by the unbroken and fast-moving fluid, is more quick and certain.

And farther, while the one blade of an ordinary screw is moving along the upper arc of its course, it displaces the water with ease; but the other blade, moving at the same instant in deep water, encounters great resistance, which tends to lift the vessel and jerk it to one side. This action, repeated twice in every revolution, puts the vessel into a state of vibration, which renders it impossible to work many steamers at full speed, and even at moderate speed loosens and endangers the stern-framing. In Hirsch's propeller, owing to the curvature of the blades, the successive parts of their surfaces are brought gradually into action in all parts of their revolution, and their force is thus divided and delivered easily and gradually without vibration, and with proportionally less expenditure of power.

In the trials on the Australian postal steamer *Western*, while a four-bladed screw of the ordinary kind gave a speed of ten knots per hour, Hirsch's propeller, two-bladed, gave eleven knots, with a saving of power, reduction of vibration, and increased facility of steering, so marked as to excite the surprise of all on board.

When it has been desired to separate the blades from the boss, or to alter their pitch, the patentee has successfully applied an arrangement, represented in the diagram, which is highly approved by engineers and practical men, on account of its superior neatness, simplicity, and strength, as compared with all other arrangements for the same purpose.

Models and drawings of Hirsch's patent screw propeller may be seen, and particulars obtained, on application to Mr. John Imray, Engineer (agent for the patentee), 65, Westminster Bridge Road, Lambeth, S., London.

[2693]

JONES, JOSIAH, JUN., *Liverpool*.—Models of Jones's patent angulated iron-cased ships, and of other vessels.

[2694]

KING, J. CHARLES, 12 *Portland Road, Regent's Park, W.*—Design of a ship of steel, cast in sections.

[2695]

KIRKALDY, DAVID, 4 *Corunna Street, Glasgow*.—Specimens of coloured engineering drawing, H.M.S. "Persia;" also photographs, engravings, &c., from exhibitor's drawings.

Photograph of the drawing of the *Persia*, price £2 2s.
Proof prints of *Arabia* and *La Plata* . . . 1 10s.
Transfer prints of ditto ditto ditto . . . 1 15s.
Experiments on wrought iron and steel . . . 0 10s.
Any of these will be sent free on receipt of post-office order.

D. Kirkaldy exhibits, in addition to the above, photographs from the drawings of the *Louis XIV.*, *Europa*, &c.; and engravings of the screw propeller and lines of the *Europa*. His coloured drawings of the engines of H.M.S. ship *Hector* is exhibited by Messrs. R. Napier and Sons.

[2696]

LAIRD, JOHN, SONS, & Co., *Birkenhead*.—Models of several classes of ships.

[2697]

LORDS OF THE ADMIRALTY, *Whitehall*.—Models of ships, &c., furnished by the Admiralty.

[2698]

MCGREGOR, JAMES, *Beechwood, Partick, near Glasgow*.—Model of screw steamer.

[2699]

MARE, MESSRS. C. J. & Co., *Millwall*.—A model of the armour-plated war frigate "Northumberland," and the Government steam-transport "Himalaya."

[2700]

MITCHELL, C., & Co., *Newcastle-on-Tyne*.—Paddle and screw steamers, for river and sea navigation.

[2701]

MULLEY, WILLIAM ROBINSON, *Lockyer Street, Plymouth*.—Model of an auxiliary and reserve rudder.

[2702]

PALMER & SWIFT, *Langbourn Chambers, Fenchurch Street*.—Patent hydraulic marine propellers, regulated independent of the engine.

[2703]

PATTERSON, WILLIAM, JUN., Ship Builder, *Bristol*.—Models of screw and paddle steamships, merchant ships, and yachts.

[2704]

PEARSE, M., & Co., *Stockton-on-Tees*.—Model of Government troop steamer for the Lower Indus.

[2705]

PERETTE, AUGUSTE, 25 *Curzon Street, May Fair, London*.—Centrifugal and centripetal propeller (combined); small boiler for the epuration of oil.

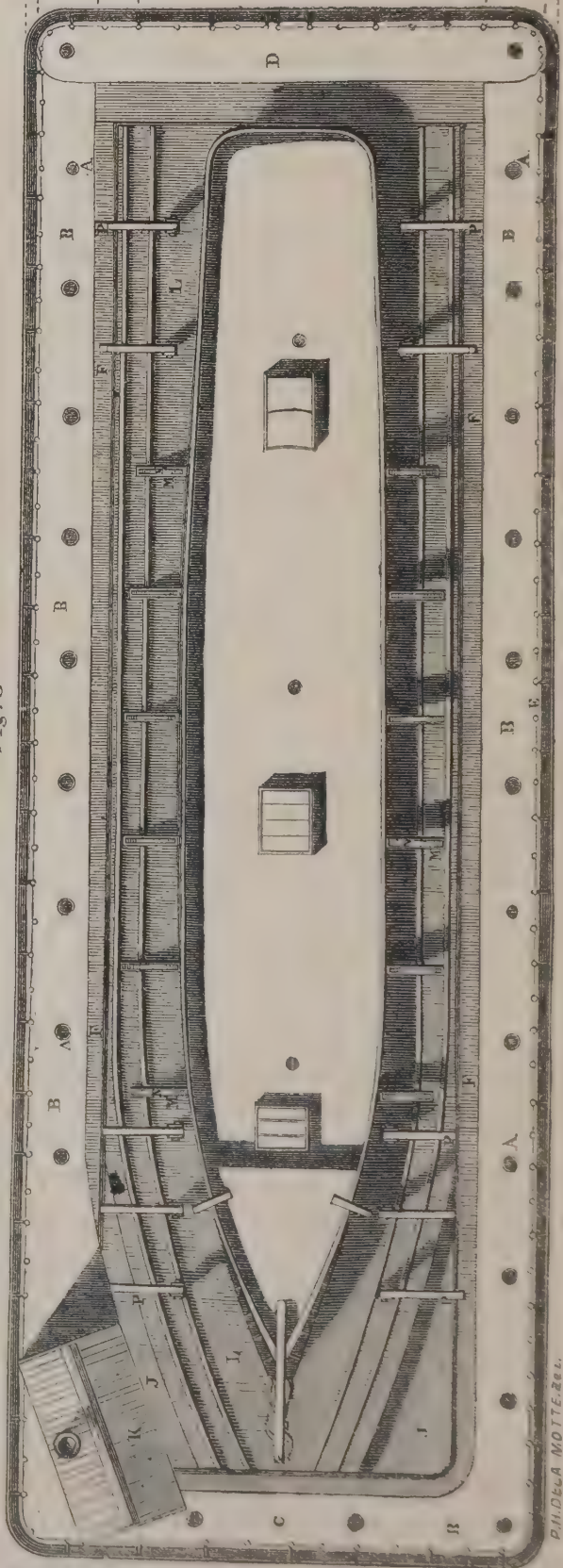
[2706]

PILE, SPENCE, & Co., *Dockyard, West Hartlepool*.—Case of models of steam vessels for various purposes; patent graving dock. (See pages 14, 15.)

PILE, SPENCE, & Co., Dockyard, West Hartlepool.—Case of models of steam vessels for various purposes; patent graving dock.



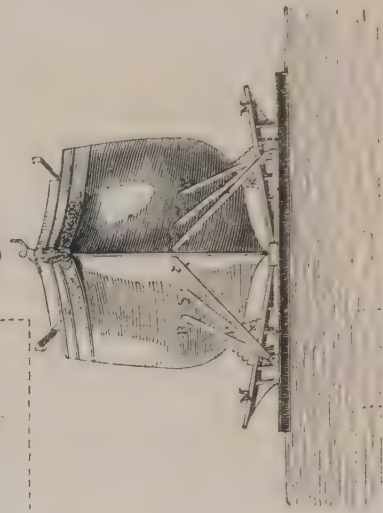
Fig. 3



SCALE OF FEET
0 10 20 30 40 50

PATENT GRAVING DOCK.

Fig. 4.



W. J. P. N. R. No.

PILE, SPENCE, & Co.—*continued.*

The object of this invention is to facilitate the raising and lowering of ships or vessels out of the water, for the purpose of repair or inspection.

Fig. 1, a longitudinal elevation; Fig. 2 is a front elevation of the dock entrance; Fig. 3 is a plan corresponding to Fig. 1; and Fig. 4 is an end view of a floating pontoon having a vessel supported thereon. The improved floating dock consists of a series of columns, A, arranged at equal distances asunder in two parallel lines. The columns, A, are pillars of wrought-iron, the lower extremities of which are firmly fixed to the bottom pontoon or lift, and act as air tubes to admit the air into the pontoon or lift as the water is pumped out. On the upper extremities of the columns, A, is built a platform, B, which is carried completely round the dock, as shown in the plan, Fig. 3, of the engraving. The columns, A, serve also as guides for the floating pontoon, F, which extends from end to end, and from side to side of the dock.

A series of tubular apertures corresponding to the number of the columns, A, are made in a vertical direction through the pontoon, F. These openings encircle the columns, A, and sufficiently large to admit of the pontoon rising and falling easily. The outer end, H, of the pontoon is formed in two parts, and these are made to swing back when required, by means of a rack and pinion, or other mechanical contrivance. The floating pontoon, F, has pendant from its lower side a series of chains, I, the lower ends of which are secured to the submerged pontoon, J, by means of which chains the submersion of the pontoon or lift is regulated to any depth. This elevating pontoon, J, is constructed of iron, thoroughly water-tight; it carries the columns, A, which are securely fixed thereon. It is so arranged that it may be partially filled with water, so as to give it a greater specific gravity than the surrounding fluid, in order that it may be submerged with facility; upon discharging this water from the pontoon, sufficient buoyant power is imparted to it to lift a vessel out of the water.

In addition to the pontoon, J, there is a secondary pontoon, L, which is constructed so as to be easily attached to it; this pontoon is made to any required size, according to the weight of the vessel to be lifted, and is attached to the pontoon, J. Upon this secondary pontoon, L, the cradle, M, and chock-blocks, N, for preventing the ship from heeling over, are arranged. Prior to the vessel being docked for examination or repair, the pontoon, L, is secured to the lower pontoon, J, as shown in the end view, Fig. 2, of the accompanying plate. The vessel is then floated into the dock, and the pontoon, J, is raised by pumping air into, or water out of, the interior thereof, the vessel being kept meanwhile equidistantly from the columns, A. When the pontoon, L, touches the keel of the vessel, the blocks, N, are brought beneath the hull, in order to keep the ship in an upright position. The blocks, N, are drawn down the inclined surface of the cradle by means of the chains, O, which are carried away below the cradle, and on to windlasses fitted for the purpose on the platform of the pontoon, F. The bow and stern of the ship is further steadied and supported by means of the shores, P, which are jointed to the pontoon, L, so that they may be readily thrown back out of the way when it is desired to release the vessel. When the ship is floated over the cradle, M, and rests upon the blocks, N, the shores, P, are brought up against the bow and stern of the vessel by the chains, Q, which may be actuated in manner similar to the chains, O. Or the chains may be made fast to eyes screwed into the cradle, M, the slack of the several chains being taken up on spindles actuated by means of the winch handles, R.

When it is desired to remove the ship from the dock, the pontoon, L, is cast off from the pontoon, J, and she is floated out thereon. To float the ship from off the pontoon, L, after repairs, the pontoon and ship are again brought into the dock and placed over the elevating pontoon, J; water is then let in to both pontoons, J and L, and they sink accordingly, leaving the ship floating on the surface. The elevation, Fig. 4, shows the ship floating upon the pontoon, L, and free from the dock.

[2707]

PORT OF DUBLIN CORPORATION, *Ballast Office, 21 Westmoreland Street, Dublin.*—Lighthouse models.

[2708]

PROCTER, SAMUEL, *Churwell, Leeds.*—Model auxiliary screw; three-masted schooner; inverted cylinders, inclosing slides to screw.

[2709]

RANDOLPH, ELDER, & Co., *Glasgow.*—Models of vessels.

[2710]

RENNIE, GEORGE, & SONS, *6 Holland Street, Blackfriars, and Greenwich.*—Models of ships; model of a floating graving dock. (See page 16.)

[2711]

RICHARDS, JOHN, *Iron Works, 27 Hill Street, Milford.*—Model of iron ship; anchors, cable.

[2712]

RICHARDSON, C. J., *34 Kensington Square.*—Drawings of projecting shields for ships.

[2713]

RICHARDSON, DUCK, & Co., *South Stockton Iron Ship Yard, Stockton-on-Tees.*—Models of iron screw steamers.

RENNIE, G., & SONS, 6 *Holland Street, Blackfriars.*—Models of ships ; model of a floating graving dock.

FLOATING DOCKS.—Messrs. George Rennie and Sons have lately constructed two floating docks on their patent, of which the accompanying engraving shows the general appearance, for the Spanish Government, capable of lifting vessels of from 5,000 to 6,000 tons dead weight, such as H.M.S. *Warrior* would be at her light draught.

Dimensions as follows :—

	No. 1.	No. 2.
Length	320 feet.	350 feet.
Breadth	105 „	105 „
Depth of base or float- ing chamber . . . }	11 ft. 6 in.	12 ft. 6 in.

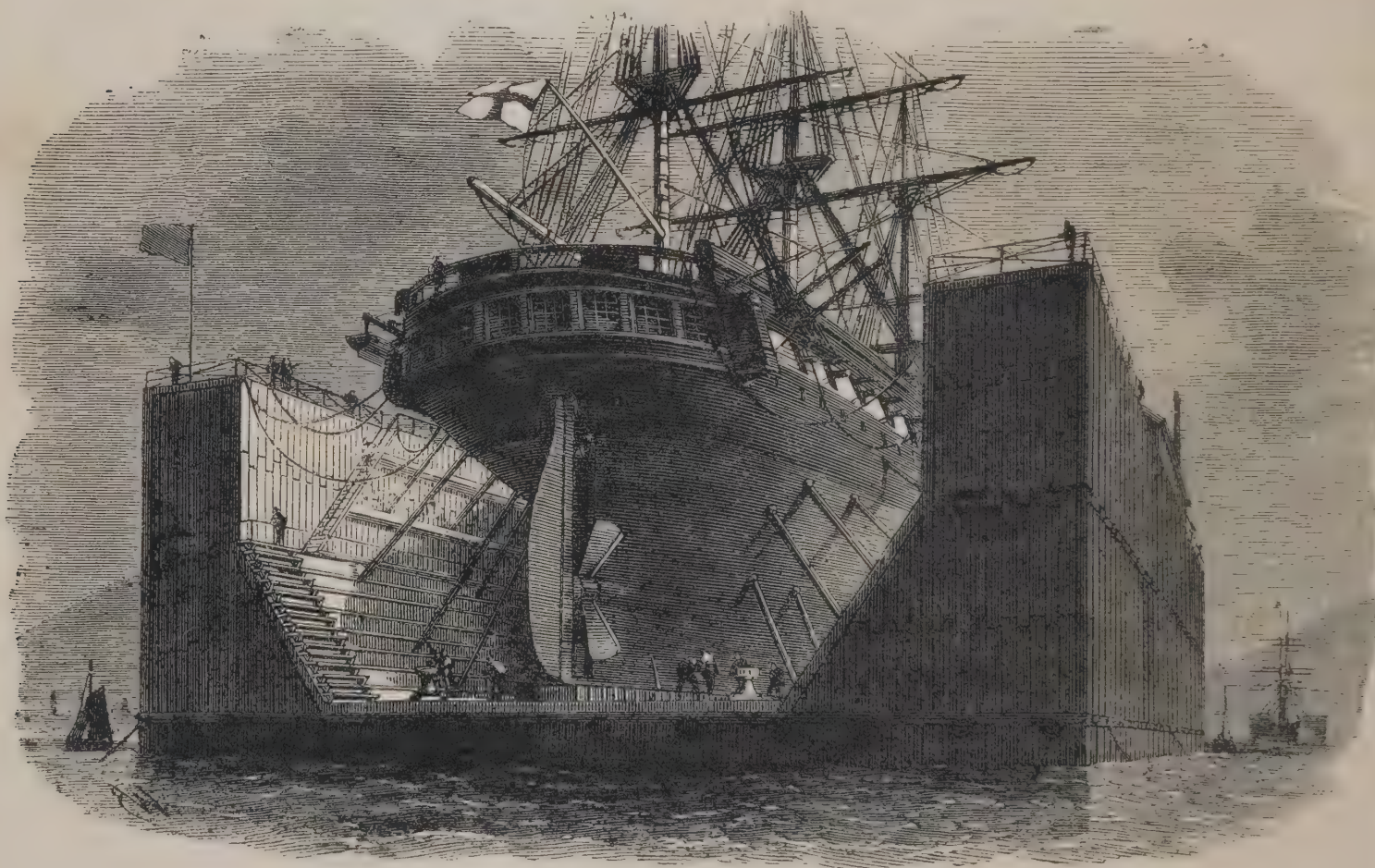
Floating docks of similar construction are suitable for localities where masonry graving docks are difficult and expensive to execute, or where there is but little rise and fall of tide ; and will be found to be of service now that

vessels of iron are so much in use both in the royal and mercantile navies.

The model exhibited is about one-third of the length of the floating dock constructed for the Spanish Government for the arsenal of Ferrol. The ends are both open, so that no gates are required, and merely the sides are closed in, against which the shores of the ships rest when docked.

The vessel and dock are lifted by the buoyancy of the lower compartment till the vessel is out of the water.

The engine and pumps are placed on the upper part of the side walls, for pumping the water out of the several chambers of the base or lower compartment. The tops of the sides are used as buoyant chambers, to prevent the possibility of the dock sinking altogether through carelessness in handling.



MODEL OF A FLOATING GRAVING DOCK.

ARRANGEMENT FOR DOCKING SEVERAL VESSELS AT ONCE BY MEANS OF FLOATING DRY DOCKS.—The arrangement exhibited shows three shallow flat horizontal slipways, radiating from a common centre. This system is intended for places where there is but little rise and fall of tide, as in the Mediterranean ; and is now being carried out at the Spanish Royal Arsenal at Carthage, in conjunction with the floating dock lately constructed by Messrs. George Rennie and Sons for the Spanish Government.

In order to dock a vessel by this means, it is first raised out of the water by the floating dock ; the floating dock, with the vessel on it, drawing about ten to eleven feet of water, is then to be hauled into a shallow basin, which is so arranged that the way on the base of the floating dock is level with the ways of the slips in it. The floating dock is then lowered by admission of water into

the base or floating chamber till it rests on the bottom of the basin. The vessel is then hauled off, and can be repaired at leisure. This operation can be repeated as often as desired with the same floating dock, until the slipways are occupied with the number of vessels they are capable of containing.

To place the vessels in the water again, the operation is simply reversed.

The model shows only three slipways ; but this number may be increased so as to obtain the required accommodation.

In case of repairs of a simple description, or such as will take a short time, or when merely an examination of the bottom of a vessel is required, the operation of hauling-off is not necessary, the vessel being merely lifted out of the water by the floating dock, examined, and afterwards allowed to float again by submerging the dock.

[2714]

RICHARDSON & Co., J. WIGHAM, *Low Walker, Newcastle-on-Tyne*.—Models of ships and steamers.

[2715]

ROBERTS & Co., RICHARD, 10 *Adam Street, Adelphi*.—Models of screw steamers, windlass and screws.

[2716]

ROBERTSON, A. J., *Hattonburn, Kinross*.—Models of ships.

[2717]

ROGERSON & Co., JOHN, *Newcastle-on-Tyne*.—Model of floating dock, and ferry steamer.

[2718]

ROSE & CROWDER, *Wapping*.—Parallel lift-dock, for repairing ships in tideless waters.

[2719]

RUSSELL, J. SCOTT, *London*.—Models of ships built on the wave principle since 1851.

[2720]

SADLER, WILLIAM, *Tredegar Place, Bow Road, Middlesex*.—Frigates, floating batteries, and gun-boats.

[2721]

SAMUDA, BROTHERS, *London*.—Models of steam-vessels “Leinster,” “Victoria,” “Tamar,” armour-cased frigates, &c.

[2722]

SHARPE, BENJAMIN, *Hanwell Park, Middlesex*.—Shot proofing for ships and batteries; gunnery instruments.

[2723]

SIMONS, WILLIAM, & Co., *London Works, Renfrew*.—Models and plans of iron ship-building and marine architecture and engineering.

[2724]

SIMPSON, ROBERT, *Dundee*.—Models of clipper ship, screw steamer, and swift river steamer.

[2725]

THAMES IRON WORKS AND SHIP-BUILDING COMPANY, *Blackwall*.—Models of iron-cased frigate “Warrior,” and other vessels.

[2726]

THOMPSON, HERBERT LEWIS, 47 *Parliament Street, Westminster*.—Models and drawings showing improved construction of iron ships.

[2727]

TOD & MCGREGOR, *Glasgow*.—Model of a screw steamer.

Model of screw steamer, *City of New York*, of the Inman line, 2,560 tons, 550 horse power, built by Tod and McGregor, Glasgow.

[2728]

TOVELL, G. R., *Ramsey, Isle of Man*.—Models of ships and vessels (Tovell & Miller's patent).

[2729]

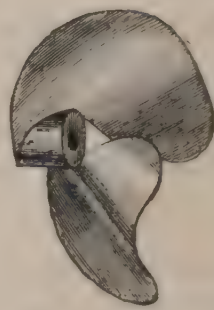
TRUSS, T. S., 53 *Gracechurch Street, London*.—Patent swift propeller.

These propellers are constructed to produce currents, the action of which will cause the surrounding water to act upon the vessel to propel her.

Without altering the angle of placement of the blades, few or many revolutions may be employed to accomplish a given speed.

With a given power, these propellers accomplish a greater speed than any others now in use, and the greater the draught of water the greater the speed.

They are simple in construction, and not liable to foul.



[2730]

VERNON, THOMAS, & SON, *Liverpool*.—Model, Woodside landing stage; caisson, Malta dockyard; and plans of first-class merchant ships.

[2731]

VINES, RICHARD, 3 *Great College Street, Camden Town*.—Newly-invented transverse floats, for propelling steam vessels without backwater.

[2732]

WALKER, WILLIAM HAMMOND (Messrs. TODD, NAYLOR, & Co.), *Liverpool*.—Floating hydraulic ship lift.

[2733]

WATSON, GEORGE, 50 *Lower Shadwell, E.*—Watson's boat lowering and disengaging apparatus.

[2734]

WRIGHT, JOSEPH WILLIAM, 4 *Cumberland Place, Old Kent Road, S.E.*—Paddle-wheels of an improved construction.



SUB-CLASS B.—*Boat and Barge Building, and Vessels for Amusement, &c.*

[2743]

AYLING, EDWARD, 50 *Lower Fore Street, Lambeth*.—Racing oars and sculls.

[2744]

BIFFEN, WILLIAM, *Middle Mall, Hammersmith*.—Models of boats. Great benefits in carriage stowage, &c.

[2745]

CANNON, HENRY, 14 *Blackwall, Middlesex*.—Model of "Peterboat," used in the whitebait fishery.

[2746]

CORYTON, JOHN, 89 *Chancery Lane*.—Ship lifeboat and main rigging, on vertical wave-line system.

[2747]

HALKETT, PETER ALEXANDER, 142 *High Holborn*.—New life-boat; a Franklin expedition knapsack boat; cloak boat. (See page 19.)

HALKETT, PETER ALEXANDER, 142 *High Holborn*.—New life-boat; a Franklin expedition knapsack boat; cloak boat.

The principle of these inventions consists in making a curved cylinder of india-rubber cloth serve for the sides and ends of a boat, by becoming distended when inflated with air. The diameter of the cylinder being large in proportion to the size of the boat, a very rigid construction is made, and no wood or framework of any kind is required. The centre part within the cylinder, or bottom of the boat, is also formed of india-rubber cloth. Before describing the life-boat marked No. 1, the inventor will refer to the smaller boats. No. 3, the boat cloak, was first invented for the purpose of crossing rivers in exploring, travelling, &c. It does not weigh more than 7 lbs. Mr. Galton, the well-known African traveller, recommends this form of the invention. In the "*Art of Travel*," he says:—"The inflated india-rubber boat is an invention which has proved invaluable to travellers. They have been used in all quarters of the globe, and are found to stand every climate. They stand a wonderful deal of wear and tear. For the general purposes of a traveller, I should be inclined to recommend as small a mackintosh boat as can be constructed, such as the cloaks that are convertible into boats."

Sir John Franklin, having seen one of these boat cloaks, asserted that if he had had such a boat at the Coppermine River, in his expedition in 1819-21, the disasters and loss of life which then happened would have been obviated. He was, at the time he saw the boat, preparing for his last Arctic expedition, and he expressed a desire to have one to take with him. The inventor recommended him to take, instead of a cloak boat, a knapsack boat, as shown in No. 2, which was the first of the kind made. This is constructed of strong canvas. It weighs no more than a regulation knapsack, and will contain three or four men. They have been used in many climates; in South Africa; by explorers in Central America, in India, and China, and in all the Arctic searching expeditions. It was the means of rescuing two of the men who were with the amiable and gallant Frenchman, M. Bellot, on the floating ice, when he lost his life; and had there been a few more minutes to spare before the ice made so rapidly away, this devoted officer's life would have been saved by its means. They have been well spoken of by many of the distinguished officers commanding those expeditions. Sir R. McClure writes, in his despatches to the Admiralty: "I cannot refrain from noticing the excellence of Halkett's boats. These admirable little articles were inflated on board, and with the greatest facility carried upon a man's shoulders over ice, which, from its excessive roughness, no other boat could possibly have been got across without being smashed. By their means a large party were relieved, who were without tents, clothing, fuel, provisions, or in any way provided to withstand the severities of a Polar night, with the thermometer at 8 deg. *minus*." And in another place: "It is impossible to recommend these boats too highly upon a service of exploring, where every article of weight is objectionable. Their whole fitting is but 25 lbs." Dr. Rae (Nov., 1847) wrote: "The boat was found most useful. It carried two men, with a quantity of stores, weighing upwards of 2 cwt., without being in the least degree overloaded. Although in con-

stant use for upwards of six weeks on a rocky coast, it never required the slightest repair." In another letter, April, 1852: "Remembering that the one I had with me in 1846-7, at Repulse Bay (where it had undergone much rough usage), had been left at York Factory, I sent for it, and had it brought more than two thousand miles in the winter to Bear Lake. During the summer season of 1851, it was in constant use for setting nets and other purposes along the Arctic coast. It is now still in very serviceable condition."

No. 1. The life-boat is made of No. 1 canvas, and roped as necessary. It is thirty or thirty-five feet long. In proportion to the number it carries it is a very cheap boat. It can be rolled up and stowed away, so as to take no more room than a spare sail. Inside the cylinders, which are of canvas, and in compartments, there are india-rubber cloth cylinders of the corresponding shape. These can be inflated by ten or twelve men in about six minutes. The canvas takes the shape, by distension, of a boat large enough to contain more than one hundred men, and floating at ease a weight of many tons. Such a boat is strong enough to suffer no damage from concussions, either against the ship's side or on a beach. It can neither overturn nor sink. It is propelled by eighteen oars, or paddles, and though slow in speed, might, the men relieving each other, make constant progress at the rate of three miles per hour, carrying, besides its crew, provisions and water for a fortnight.

In addition to this invention of the inflated life boat, a sail-ladder, when the wind is not too high at the time to use it, has been designed for getting the passengers rapidly and easily into the boat, especially the women and children, who often in cases of fire or wreck are found very difficult to be got into boats. The ladder, made of canvas, is six or eight feet wide "puckered," or folded into various rows of steps, with ropes passing down on each side of the rows. It has been found that even while such a canvas ladder is tossed about with a very violent motion, men, boys, women, and children can go down and up the steps with great facility. The feet can hardly go in any other direction than into the "pucker," and they are very firmly retained in the hollow made by the pucker. In the middle of the breadth of canvas a plain unpuckered surface, some two feet wide, is retained, in order that those who choose may slip down into the boat, and that light articles may be hastily and safely sent down into it from the ship's deck.

The inventor never received any profit or benefit from the use of these boats, and he did not retain a monopoly of their manufacture. It is not with any motive of self-interest that he proposes the application of this principle for ship's life boats, but solely with a view of directing the attention of the public, and especially of members of Parliament, to the fact that such appliances for saving life can be efficiently carried out, that he exhibits plans and drawings of boats such as one he had constructed, and which carried more than a hundred persons. He believes that in this invention the difficulty is practically surmounted of an emigrant ship carrying with it the means of sending away at once all the people on board in case of wreck or fire.

The exhibitor begs to refer persons desirous of further information respecting the boats to S. Matthews and Son, successor to Charles Macintosh & Co., 58, Charing Cross; and to Mr. W. Wellby, who made the large boat, and witnessed the trials made with it, and whose address will be given upon application to Mr. Matthews, or to Mr. Weir, 142, High Holborn.

ROYAL NATIONAL LIFE-BEAT INSTITUTION, 14 *John Street, Adelphi, W.C.*—Life-boat on her transporting carriage; models of life-boats, and of other life-saving apparatus; gold and silver medals of the institution; large wreck chart of the British Isles for 1861, barometer model indicators, &c.

Patroness—HER MOST GRACIOUS MAJESTY THE QUEEN.

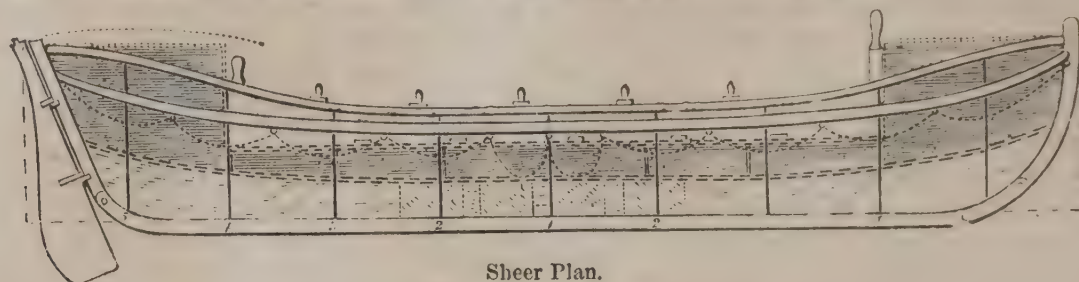
President—VICE-ADMIRAL HIS GRACE THE DUKE OF NORTHUMBERLAND, K.G., F.R.S.

Chairman—THOMAS BARING, Esq., M.P., F.R.S., V.P., Chairman of Lloyd's.

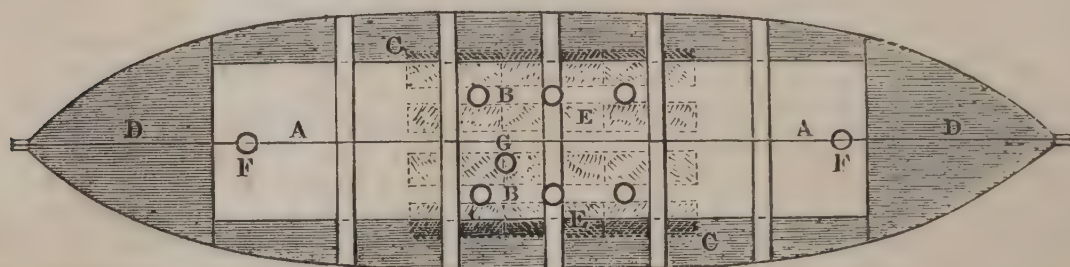
Deputy-Chairman—THOMAS CHAPMAN, Esq., F.R.S., V.P.

Secretary—RICHARD LEWIS, Esq. Inspector of Life-boats—Captain J. R. WARD, R.N.

DRAWINGS OF THE LIFE-BEAT OF THE ROYAL NATIONAL LIFE-BEAT INSTITUTION.



Sheer Plan.



Deck Plan.

This life-boat possesses in the highest degree all the qualities which it is desirable that a life-boat should possess:—1. Great lateral stability. 2. Speed against a heavy sea. 3. Facility for launching and for taking the shore. 4. Immediate self-discharge of any water breaking into her. 5. The important advantage of self-righting if

upset. 6. Strength. 7. Stowage-room for a number of passengers.

During the past two years (1860–1) the life-boats of the National Life-boat Institution have been instrumental in rescuing the crews of the following vessels:—

Schooner <i>Ann Mitchell</i> , of Montrose	1	Brig <i>Prodroma</i> , of Stockton	11	Brig <i>St. Michel</i> , of Marans	8
Schooner <i>Jane Roper</i> , of Ulverstone	6	Brig <i>Eliza</i> , of Middlesborough	7	Spanish Barque <i>Primera de Torre-</i>	
Brig <i>Pallas</i> , of Shields	3	Brigantine <i>Freia</i> , of Konigsberg	6	<i>viega</i> —Saved vessel and 1 of the	
Ship <i>Ann Mitchell</i> , of Glasgow	9	Brigantine <i>Diana</i> , of Fredrikshamn	7	crew	1
Smack <i>John Bull</i> , of Yarmouth	5	Brig <i>Gloucester</i> , of South Shields	7	Schooner <i>Hurrell</i> , of Penzance—	
Schooner <i>Catherine</i> , of Newry	4	Brig <i>Lovely Nelly</i> , of Seaham	6	Saved vessel and crew	4
Barque <i>Niagara</i> , of Shields	11	Brigantine <i>Nugget</i> , of Bideford	5	Brig <i>Anne</i> , of Plymouth—Saved	
A Barge of Teignmouth	2	Schooner <i>Prospect</i> , of Berwick	6	vessel and crew	8
Brig <i>George and James</i> , of London	8	Sloop <i>Thomas and Jane</i> , of St. Ives	3	Schooner <i>Betsey</i> , of Peterhead—	
Brig <i>Zephyr</i> , of Whitby	6	A Fishing-boat of Whitburn	4	Saved vessel and crew	6
Coble <i>Honour</i> , of Cullercoats	3	Brig <i>Arethusa</i> , of Blyth	8	Barque <i>Frederick</i> , of Dublin	1
Schooner <i>Eliza</i> , of North Shields	7	Schooner <i>Dewi Wyn</i> , of Portmadoc	8	Barge <i>Peace</i> , of London	2
Barque <i>Oberon</i> , of Liverpool	15	Flat <i>Cymraes</i> , of Beaumaris	2	Lugger <i>Saucy Lass</i> , of Lowestoft	11
Brigantine <i>Nancy</i> , of Teignmouth	9	Schooner <i>William</i> , of Morecambe	5	Schooner <i>Fly</i> , of Whitby—Saved	
Smack <i>Wonder</i> , of Teignmouth	2	Smack <i>Gipsy</i> , of Newry	4	vessel and crew	4
Brig <i>Scotia</i> , of Sunderland	6	Schooner <i>Margaret Anne</i> , of Preston	4	Smack <i>Adventure</i> , of Harwich	10
Sloop <i>Three Brothers</i> , of Goole	5	Brig <i>New Draper</i> , of Whitehaven	8	Pilot cutter <i>Whim</i> , of Lowestoft	7
Sloop <i>Charlotte</i> , of Woodbridge	5	Schooner <i>William</i> , of Liverpool	5	Barque <i>Undaunted</i> , of Aberdeen	11
Brig <i>Ann</i> , of Blyth	8	Lugger <i>Nimrod</i> , of Castletown	3	Wrecked boat on Blackwater Bank,	
Sloop <i>Hope</i> , of Dublin	3	Brig <i>Providence</i> , of Shields	8	on the Irish Coast	1
Schooner <i>Druid</i> , of Aberystwyth	5	Brig <i>Mayflower</i> , of Newcastle	8	Schooner <i>Skylark</i> , of Folkestone	6
Barque <i>Vermont</i> , of Halifax, U.S.	16	Schooner <i>Village Maid</i> , of Fleetwood	4	Brig <i>Lively</i> , of Clay, Norfolk	5
Schooner <i>William Keith</i> , of Carnarvon	2	Barque <i>Guyana</i> , of Glasgow	19	Barque <i>Robert Watson</i> , of Sunderland	5
Brig <i>Flying Fish</i> , of Whitby	5	Brig <i>Roman Empress</i> , of Shields	10	Schooner <i>Auchincruive</i> , of Grange-	
Smack <i>Elizabeth Ann</i> , of Lyme	3	Brig <i>San Spiridione</i> , of Galaxide	2	mouth	6
Regis	3	Schooner <i>Voador du Vouga</i> , of Vianna	8	Schooner <i>Friends</i> , of Lynn	4
Steam Dredge, at Newhaven	9	French Brig, <i>La Jeune Marie Therese</i>	6	Schooner <i>Eliza Anne</i> , of Dublin	5
Schooner <i>Admiral Hood</i> , of Rochester	6	Barque <i>Perseverance</i> , of Scarborough	5	Brig <i>Content</i> , of Sunderland	5
Schooner <i>Susan and Isabella</i> , of Dundee	5	Schooner <i>Elizabeth</i> , of Bridgewater	4	Smack <i>Ellen Owens</i> , of Cardigan	3
Schooner <i>Rose</i> , of Lynn	3	Ship <i>Danube</i> , of Belfast	17	Schooner <i>Epimachus</i> , of Amsterdam	5
		Schooner <i>Hortensia</i> , of Hanover	4		
		Schooner <i>Oregon</i> , of Stonehaven	4		
				Total	498

For these and other life-boat services the Institution has voted £1,893 as rewards. It has also granted rewards amounting to £515 10s. for saving 373 shipwrecked persons, by shore-boats and other means, making a total of 871 persons saved from a watery grave during the last two years.

The number of lives saved by the life-boats of the society, and other means, since its formation, is upwards

of 12,200; for which services, 82 gold medals, 704 silver medals, and £15,250 in cash have been granted as rewards. The Institution has also expended since its establishment nearly £60,000 on life-boat establishments.

Contributions are received by all the bankers in the United Kingdom; and by the Secretary, Richard Lewis, Esq., at the Institution, 14 John Street, Adelphi, London, W.C.

ROYAL NATIONAL LIFE-BOAT INSTITUTION—*continued.*



THE LIFE-BOAT OF THE ROYAL NATIONAL LIFE-BOAT INSTITUTION GOING OFF TO A WRECK.

[2748]

HAMLEY, JOHN ISAAC, 16 *Capland Street, Lisson Grove*.—Model of life-boat.

[2749]

HAWKESWORTH, AMORY, & ANNERSLEY, GEORGE, 65 *Lincoln's Inn Fields*.—Model of the Hartlepool Seamen's Association Life-boat, in use since 1853.

[2750]

HUTCHINS, WILLIAM, *Croom's Hill, Greenwich*.—Self-righting, indestructible pneumatic life-boat, and shot-proof ship's cutter.

[2751]

JORDESON, THOMAS POWDITCH, *Eastcheap*.—Patent life-boat, and apparatus for converting ships' boats into life-boats.

[2752]

LEARWOOD, THOMAS, *Truro, Cornwall*.—Life-boat, propelled without oars through the surf; cannot fill; self-righting.

[2753]

PRESTON, LIEUT. THOMAS, R.N., *Lowestoft*.—Double rudders, less liable to accident; propeller, blades unship from arms.

[2754]

PYM, JOHN, 4 *Laurence Pountney Hill, London*.—Double sheer hulk for raising sunken vessels (Pym's patent).

[2755]

RICHARDSON, HENRY THOMAS, *Aberhirnant, Bala, N.W.*—Model of "Richardson's patent iron tubular life-boat."

[2756]

ROYAL NATIONAL LIFE-BOAT INSTITUTION, 14 *John Street, Adelphi, W.C.*—Life-boat on her transporting carriage, models of life-boats, and of other life-saving apparatus, &c. (*See pages 20, 21.*)

[2757]

SEARLE, EDWARD, *Stangate, Lambeth*.—Model of state barge.

The exhibitors hold the appointment of boat builders to Her Most Gracious Majesty the Queen, H.M. the Emperor of the French, H.M. the Emperor of Austria, H.R.H. the Prince of Wales, H.R.H. the Prince of Prussia, H.S.H. Prince Edward of Saxe Weimar, H.H. Ismael Pacha, H.H. Prince Duleep Singh, the Lords

Commissioners of the Admiralty, the Right Honourable the Board of Ordnance, the Honourable Board of Conservators of the River Thames, the Universities of Oxford and Cambridge, the Eton and Westminster Schools, the "Guards," "Leander," and other distinguished Clubs, and most of the leading Amateurs.

[2758]

STEVENS, WILLIAM, *Trinity Square, Tower Hill*.—Model, ships and boats, and every requisite for fitting and rigging.

[2759]

THOMPSON, NATHAN, 21 *Rochester Road, N.W.*—Models of Thompson's new patented system for building boats by machinery.

[2760]

TWYMAN, HENRY, 26 *Hardres Street, Ramsgate*.—Lugger life-boat, built with air-tight compartments.

[2761]

WATSON & DAVISON, 5 *Munster Square, Regent's Park*.—Patent safety rowlocks.

[2762]

WENTZELL, ANDREW, *Lambeth, and Crystal Palace*.—Improved models of boats (various kinds) for speed and pleasure.

SUB-CLASS C.—*Ships' Tackle and Rigging.*

[2774]

ADCOCK, JOHN, *Marlborough Road, Dalston, London.*—A marine “odometer;” or, improved ship’s log; various modifications.

[2775]

BERREY, CAPTAIN GEORGE A., *32 Fenchurch Street, London.*—A “sphereometer,” for facilitating the practice of great circle sailing.

[2776]

BIRT, J., *5 Wellclose Square.*—Model of the mortar and rocket life-saving apparatus.

[2777]

BLAKENEY, J. W., & Co., *Hull, Glasgow, and Sunderland.* (*See page 24.*)

[2778]

BROWN, J. H., *Adelaide Place, London Bridge.*—A floating buoy for saving ship’s papers when wrecked.

[2779]

BROWN, LENOX, & Co., *Billiter Square, E.C., and Millwall, Poplar, E.*—Malleable cast iron blocks and sheaves.

[2780]

DANBY, JAMES F., *11 Cantelcues Road, Camden Square, N.W.*—Model of “Danby’s patent anchor.”

[2781]

GIFFORD, WM. J., *Wellington, and 39 Devonshire Street, Queen Square, London.*—A model gaffyard rig.

The following is exhibited:—A model of a full-rigged vessel, viz., a three-masted steamer, in a glass case, showing the application of the new system of rigging and sail-making, called the “GAFFYARD RIG.” The general object of this system is the perfection of the art of sailing, more especially “close-hauled” (*i.e.*, obliquely against the wind), with complete command of the course and position at any angle with the wind, or point of the compass. Some of the improvements and modifications in which this system differs from others, may be understood by the following particulars:—

1. The tension of the canvas is equalised everywhere; and at any part liable to undue or irregular strain, the sail is secured by an interposed breadth of a cloth manufactured expressly for the purpose. It may also be secured by “cord-bands.”

2. The sails are “bent head and foot.”

3. A more perfect “set” of the sail is thus obtained, with this essential peculiarity, that the curving, or “bellying,” is in the perpendicular and not in the horizontal direction. The surface is therefore straight, in the horizontal sense.

4. The sails are to windward instead of to leeward of the masts and gear, the result being that when “close up,” the masts are sheltered from the wind; and secondly, the wind passes off the sails without impediment at any angle.

5. The yards, as well as the gaffs, are “fore and aft.” This new system may, in some sense, be viewed as a combination of the two common rigs known as the “square” and the “fore and aft” rigs; and hence the term “gaffyard” rig is applied to it.

BLAKENEY, J. W., & Co., *Hull, Glasgow, and Sunderland.*



IMPROVED ANTI-VIBRATION STEERING COMPASS FOR STEAMERS.

[2782]

GLADSTONE, THOMAS MURRAY, 30 *Parliament Street, London, S.W.*—Two models of a "patent anchor," an iron and a wood stock.

[2783]

GODDARD, JOHN MAYNARD, 9 *Ship Street Lane.*—Specimens in the manufacture of ships' blocks.

[2784]

HAWKS, CRAWSHAY, & SONS, *Newcastle-on-Tyne*.—Model of Trotman's patent anchor, 95 cwt., supplied to H.M. frigate "Warrior." (For Illustration, see page 28.)



INTERNATIONAL EXHIBITION,
PARIS, 1855.
GRANDE MEDAILLE 1RE CLASSE,
A J. TROTMAN, 42 CORNHILL,
LONDON.



The model of Trotman's anchor, 95 cwt., made for Her Majesty's iron-cased frigate "Warrior," and exhibited by Messrs. Hawks, Crawshay, & Sons, Newcastle-on-Tyne.

The Lords Commissioners of the Admiralty nominated as an anchor committee the Honourable Admiral Sir M. Stopford, K.C.B., &c.; Admiral George R. Mundy, C.B., &c.; the late Admiral Charles Hope, C.B.; and other naval officers; with whom were associated Duncan Dunbar, Esq., the chairman of the General Shipowners' Society, and five gentlemen of "Lloyd's Classification Committee"—"to investigate and determine, by a series of practical proofs and tests, the relative merits of different descriptions of anchors." Their unanimous report, dated 1st of February, briefly recapitulates the order of merit, as follows:—

ART. 29.—"The committee here beg to recapitulate the order in which they consider the anchors to stand, together with their relative per-centage of inferiority or superiority to the Admiralty anchor, the value of which being taken as the standard or unit :

Trotman	1.28 or 28 per cent.	} superior to Admiralty anchor.
Rodgers	1.26 or 26 "	
Mitcheson	1.20 or 20 "	
Lenox	1.13 or 13 "	
Porter	1.09 or 9 "	
Aylen	1.09 or 9 "	
Admiralty	1. = the standard."	

The Royal yacht, "Victoria and Albert;" also the French and Russian imperial yachts, "La Reine Hortense," "Le Prince Jerome," &c. &c.; the steam-ship "Great Eastern;" the ships of the Cunard Company, Peninsular and Oriental Company, the Royal Mail Company, the Messageries Imperiales, the Austrian Lloyd's, and the mercantile marine generally, are supplied with Trotman's improved anchors at about one-third less weight than would be required for ordinary anchors—a desideratum which the anchor committee deem "of vast importance to the shipping interest."—*Vide paragraph 9 Official Report.*

The distinguishing feature peculiar to Trotman's anchor is the palm being set at an acute angle to the

line of strain, and differing from that of the arm : in action, it is found to bite the ground instantaneously as a ploughshare, and by reason of the vibratory motion of the arms, the pressure of the upper arm on the shank imparts increased penetration to the lower arm in the ground ; or in other words, the heavier the strain, the more tenacious the holding properties. It possesses other advantages besides strength, and holding-power more than doubled ; viz., freedom from fouling the cable—increased efficiency with reduced weight, affording very material relief to ship's bows in a head sea—facility of transport to or from ships by means of boats—convenience of stowage—elasticity of form, which enables it to sustain sudden strains or jerks at short stay-peak, and concussion, when let go on hard or rocky bottoms.

Comparison suggests the following conclusions :—the angle of the palm and arms of Porter's and other anchors being identical ; the ordinary anchor, likewise, in action is a mere scraper, accumulating, as it were, the loose surface, instead of biting and retaining its fulcrum of resistance in unbroken ground ; its form rigid and inflexible, a mass of iron, one-third of which is never available, and really mischievous—as the upper arm is ever liable to be fouled or hooked by the cables of other ships in crowded anchorages—presenting always a dangerous projection to ship's bottoms, in shoal water, tidal harbours, and rivers. The principle of Trotman's anchor obviates these objections. It is flexible in its parts, each contributing its portion of duty to the whole, and adapting itself to every emergency.

The following are some of the eminent firms licensed by the patentee to make Trotman's anchors, viz.—Messrs. Hawks, Crawshay, & Sons, Newcastle-on-Tyne and London ; Wood & Co., Liverpool, Chester, and London ; John Abbot & Co., Gateshead-on-Tyne ; Pow & Fawcus, North Shields ; Robert Wight & Son, Sunderland and Seaham ; N. Hingley & Sons, Netherton and Cradley Iron-works ; Henry P. Parkes, Dudley and Liverpool.

Patentee's office, 42, Cornhill, London.

[2785]

HERBERT, GEORGE, *Dartford*.—Bury, Beacon, Telegraph Station Battery, moored from centre of gravity; ship's motion metre, self-registering.

[2786]

HOLSGROVE & REED, *Sunderland*.—Model of Reed's patent anchor; specimens of iron ship knees and forgings.

[2787]

HOLTUNG, WILLIAM, *Church Street, Walmer*.—Model of balista, for making communication with stranded vessels.

[2788]

HUNTER, SAMUEL, 22 *Grey Street, Newcastle-on-Tyne*.—Model of a new anchor.

[2789]

JEULA, HENRY, *Lloyd's, E.C.*—Martin's patent anchor: immediate hold, immense power, no fouling, easy tripping and fishing, great lightness.

[2790]

LAING, JAMES, 2 *M'Vicar's Lane, Perth Road, Dundee*.—Helixameter, for experimenting on the screw propeller. Combined screw pump for ships, and compound ventilator for ships.

HELIXAMETER.—The purpose of this machine is to make an experimental investigation into the properties of the screw as a propeller; more particularly in consideration of the "pitch." The tables and diagrams accompanying the machine are constructed on experimental data ascertained by its use, and on examining these some very remarkable properties of the screw will be observed. The most prominent of these are, that the greatest possible thrust is obtained, and that neither positive nor negative slip occurs when the pitch is equal to the diameter.

COMBINED SCREW PUMP FOR SHIPS.—The objects in the construction and action of this pump are, small first cost, easy keep, and certain action under any probable circumstances, besides giving with small power a large and continuous discharge of water.

COMPOUND VENTILATOR FOR SHIPS.—This system produces both a downward and upward current of air acting in combination. The ventilators are made either of metal as fixtures, or of cloth as wind-sails, to be used at pleasure. A thorough ventilation is obtained by this system.

[2791]

LONGHURST, JOHN, *Ticehurst, Sussex*.—Breakless cable chain.

[2792]

MACDONALD, JOHN, 13 *Henry Street, Vauxhall*.—Compass, with accompaniments, for longitude and latitude; also, ship's lamps.

[2793]

MARTIN, CLAUDE, 10 *Bath Place, Hatcham*.—Improved Porter's anchors, and a *bombe-mitraille* (unloaded).

[2794]

MOORE, C., *Swansea*.—A spherical indicator, for nautical and astronomical purposes.

[2795]

PARKES, HENRY PERSHOUSE, *Chain and Anchor Works, Tipton, Staffordshire*.—Chains and anchors of various descriptions.

[2796]

PEACOCK, GEORGE, F.R.A.S., *Starcross, Devon*.—Refuge buoy-beacon, granulated cork poncho-mattress; life and treasure preserver; unfoulable anchor.

[2797]

RETTIG, EMIL, *London*.—Martin's anchor (patented), with holding power double that of ordinary anchors, and inability to foul.

[2798]

RICH, WILLIAM, 14 *Great Russell Street, Bloomsbury*.—Improved kite for carrying a line or man, &c., on shore from stranded vessels.

[2799]

ROGERS, M. D., *St. Leonard's Road, Poplar*.—Models of boat lowering gear, chain cable, stopper, controller, and windlass.

Wood and Rogers' patent suspending and detaching apparatus for ships' boats. The advantages of this method will be obvious from the following observations:—

The boat being suspended from four points instead of two, prevents the possibility of canting while persons are getting in or in lowering; and it may be detached, however fast the vessel may be going through the water, with ease and safety.

This apparatus is so compact, that the boat may be filled with provisions, &c., there being no ropes to foul or kink, to the danger of persons in the boat.

The suspension is so secure, that the boat may hang to the davits without gripes or lashing.

The detaching is effected by simply raising a lever.

Kendall and Rogers' patent chain cable controller, for windlass to be fixed on deck. The advantage of this is, that it prevents the chain from riding, in paying out or heaving in, which it effectually does by avoiding the necessity of fleating. It is simple, and not expensive.

Rogers' patent chain cable stopper is intended to secure any link in heaving up, and to assist in paying out chain; to give cable in bringing up ships, or at the chain cable locker.

[2800]

ROGERS, WILLIAM, *Waterloo Street, Swansea*.—A ship's steering apparatus.

[2801]

ROYAL HUMANE SOCIETY, 4 *Trafalgar Square, W.C.*—Models of apparatus, used for rescuing and recovering persons apparently drowned or dead.

[2802]

SAMUEL, DAVID A., 3 *Cedar Place, West Ham, Essex*.—Steering apparatus.

This is a model of a steering apparatus on a new principle. This new method will be much quicker in its action, and more safe at sea than the old chain principle. Three turns of the wheel will bring the helm from port

to starboard, and a single person will be able to steer in the heaviest sea, without fear of being overpowered by the wheel, as often occurs in very rough weather. It is also well adapted for river purposes.

[2803]

SMITH, ROBERT, 23 *Fish Street Hill*.—Solid cork life buoy, jacket, belt, and waterproof cork socks.

Obtained honourable mention at the Paris Exhibition, 1855.

The buoys and belts invented by R. Smith are celebrated for their durability and buoyancy.

The socks, invented in October, 1861, are superior to any yet offered to the public.

[2804]

SOLOMON, JOSEPH, 22 *Red Lion Square, London*.—Sphereometers, for facilitating great circle sailing, obviating abstruse calculations.

[2805]

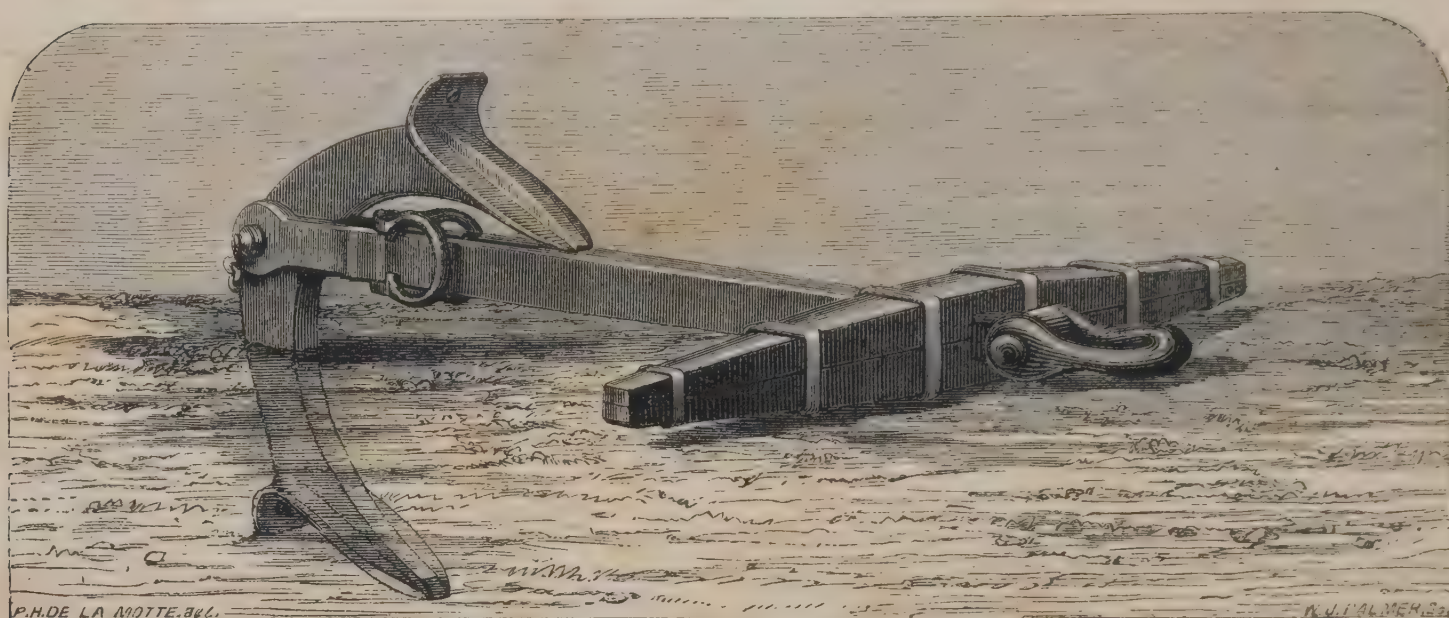
STONE, JOSIAH, *Deptford, London*.—Side lights, blocks, copper nails, rullocks, boat fittings, &c.

[2806]

TENWICK, JOHN, *Albion Foundry, Clarendon Street, Landport*.—Patent steering apparatus.

[2807]

TROTMAN, J., 42 *Cornhill*.—Model of Trotman's anchor used on board H.M. yacht "Victoria and Albert."



TROTMAN'S ANCHOR.

[2808]

TYLOR, J., & SONS, *Warwick Lane, Newgate Street, London*.—Apparatus for distilling fresh from sea water.

[2809]

WALKER, THOMAS, & SON, *Oxford Street, Birmingham*.—Ship logs, and sounding machines.

[2810]

WARD, CAPTAIN J. R., R.N., *New Brentford*.—Cork life-belt, for use of life-boat men, and ship's crews.



CORK LIFE-BELT FOR USE OF LIFE-BOAT MEN.

These life-belts possess buoyant power averaging 26 pounds, being double that of ordinary cork life-belts.

The advantages of this belt are—

1. It secures great buoyancy without inconvenience to the wearer.
2. It is perfectly flexible.
3. It affords great protection to the body against injury when in the water.
4. It is very strong and durable, is little liable to injury, and is readily repaired if injured.
5. Being tightly secured round the waist, it cannot slip upwards or downwards, but is always in the best position for preserving the equilibrium of the wearer.

These life-belts have already been the means of saving a large number of lives. They are supplied to the life-boats' crews of the National Life-boat Institution on the coasts of the United Kingdom, and to the crews of coast-guard stations.

Manufacturer, Mr. J. Birt, Jun., maker of life-saving apparatus, 5 Wellclose Square, London.

[2811]

WATSON, THOMAS, 49 *Rupert Street, W.*—Application of friction break to ships' capstans (working model).

This invention brings the capstan under the entire control of one man, who is entirely out of danger, and prevents the necessity of the men having to walk backwards. At an inquest held on the bodies of some men

killed by one of these accidents on board H.M.S. "Nile," in January, 1861, the jury expressed a hope that something might be invented which would prevent the recurrence of such accidents in future.

[2812]

WEST, JOHN GEO. & Co., 92 & 93 *Fleet Street.*—Ships' and boats' binnacles, and patent liquid compasses.

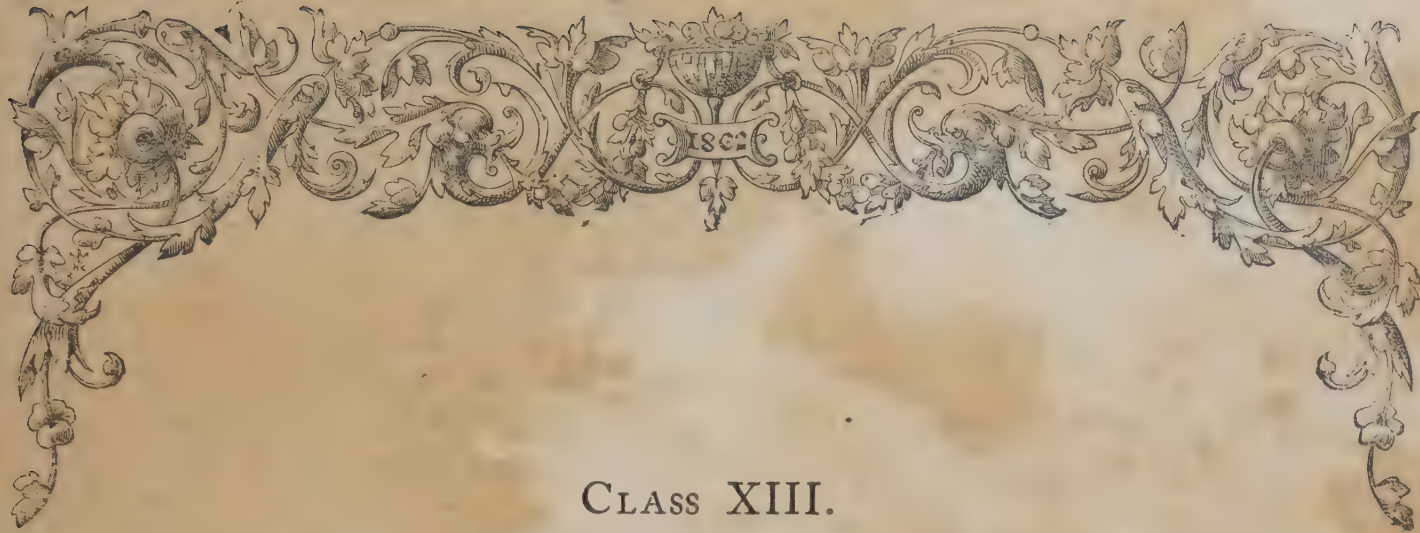
[2813]

WIGHT, ALEXANDER, 14 *Lansdowne Crescent, W.*—Compound iron cable.

[2814]

WOOD & Co., *Liverpool, London, and S'ourbridge.*—Chains, cables, and anchors.





CLASS XIII.

PHILOSOPHICAL INSTRUMENTS, AND PROCESSES DEPENDING UPON THEIR USE.

[2845]

ACKLAND, WILLIAM, 19 *Church Row, Newington Butts*.—Dividing engine, and instruments divided thereby.

[2846]

ADIE, PATRICK, 395 *Strand*.—Patent semicircle; patent diastameter; patent theodolite level; patent level; patent surveying compasses; standard barometer; eidograph (Wallace's).

[2847]

ADIE, RICHARD, 55 *Bold Street, Liverpool*.—A gold disc steam and vacuum gauge; an alcohol hermetic barometer; a double telescope.

[2848]

ALDOUS, W. LENS, 47 *Liverpool Street, King's Cross*.—Microscopic drawings of the human breath, and other curiosities.

[2849]

ALISON, DR. S., 80 *Park Street, W.*—Differential double stethoscope; sphygmoscopes; stethogoniometer; and hydrophone, used in chest diseases.

[2850]

ALLAN, THOMAS, C.E., 1 *Adelphi Terrace, Strand, W.C.*—Mechanical or automatic recording telegraph; electro-magnetic engine; submarine cables, &c.

[2851]

BAGOT, CHARLES E., M.D., *Claremont Mall, Dublin*.—Nephhelescope, for viewing the upper strata of clouds.

[2852]

BAILEY, J. W., 162 *Fenchurch Street, London*.—Sextants; artificial horizons; theodolites; levels; prismatic compasses; drawing instruments.

Pillar sextant, on counterpoise stand.
Bell metal and box sextants.
Gravatt's dumpy level.
Transit and Everest's theodolites.
Prismatic compass.

Artificial horizons, mercurial and dark glass.
Universal compass (a new method of describing an ellipse), which comprises triangular and hair compasses, pen, and pencil joints; and forms a complete set of instruments.

BAKER, CHARLES, 244 *High Holborn*.—Microscopes, and their appliances; surveying, engineering, and drawing instruments; ivory and box rules, &c.

The following are exhibited:—

Binocular and other microscopes, achromatic object-glasses and apparatus, and materials for mounting preparations; also surveying, levelling, and drawing instrument of all kinds.

No. 1.—Highly finished compound microscope, with mechanical and secondary stages, and all the latest improvements, £ s. d.
with two Huyghenian eye-pieces 20 0 0



No. 1 MICROSCOPE.

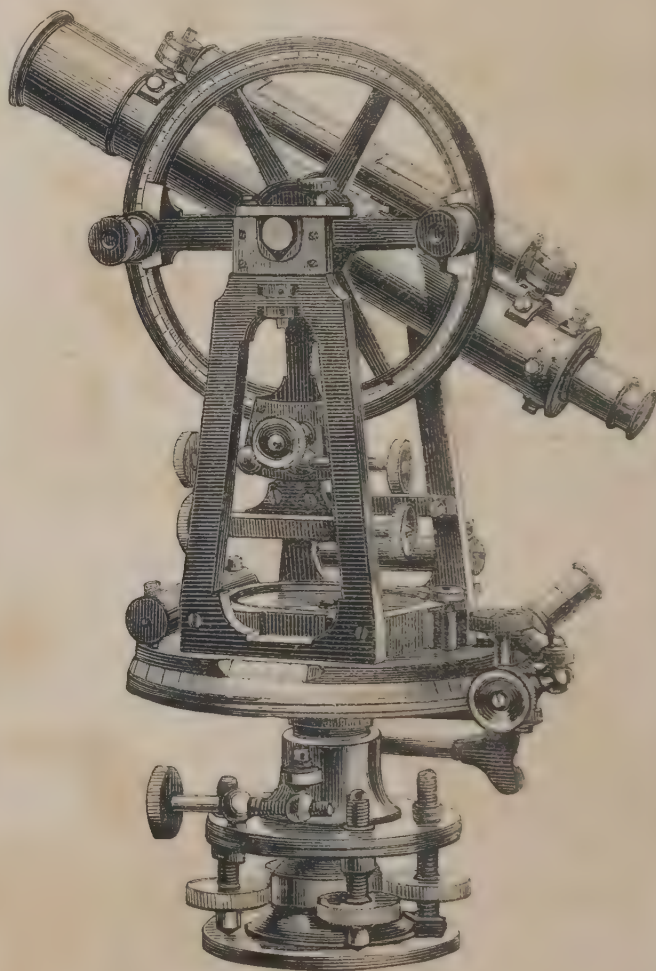
No. 1 A.—A microscope of the same size, but without secondary stage £ s. d.
13 10 0
No. 1 B.—A small microscope, having mechanical stage, &c. 11 10 0
No. 1 B.—With plain stage 7 15 0
No. 2.—Two sizes smaller, with mechanical stage and one eye-piece 8 15 0
No. 2.—With plain stage 6 15 0
No. 3.—A student's ditto, with slow motion, object glasses, case, and apparatus complete 6 15 0
No. 3.—Ditto, without slow motion 5 15 0
No. 4.—A student's microscope, complete 4 15 0
No. 5.—Educated microscope, complete 3 3 0

ACHROMATIC OBJECT GLASSES, OF LARGE ANGULAR APERTURE.

	Degrees.	£	s.	d.
3 inch	10	...	1 15	0
2 „	12	...	1 10	0
Ditto	15	...	1 17	6
1½ inch	20	...	1 17	6
1 „	23	...	1 17	6

	Degrees.	£	s.	d.
2 inch	30	...	2 5	0
1½ „ with adjustment	60	...	3 0	0
1¼ „ „	70	...	3 5	0
1¼ „ „	75	...	3 5	0
1¼ „ „	95	...	3 15	0
1¼ „ „	115	...	5 5	0
1¼ „ „	125	...	6 6	0
German, ½, 1, & 1½ inch	...	...	1 2	6
Ditto, ¼, ½, ¾ „	...	...	1 5	0

A first-rate 6-inch transit theodolite, bright or bronzed, with vertical and horizontal circles, and verniers divided on silver to 20 min. The clamping and tangent adjustments of the most approved make. An inverting and erecting eye-piece, with tripod, stand, and mahogany case £ s. d.
22 10 0



TRANSIT THEODOLITE.

6-inch ditto, without vertical arc £ s. d.
21 0 0
6-inch bronzed or bright theodolite, with all the latest improvements 20 0 0
Ditto, ditto, 5 inch 18 10 0
Gravatt's improved 14-inch dumpy level, bronzed or bright, complete 10 10 0
Ditto, ditto, with silver ring compass 11 10 0
12-inch ditto 11 0 0
Ditto, without compass 10 0 0
Station staves, from 35s. to 2 5 0
Mining dials, from 6l. 10s. to 10 0 0
Pocket sextants, from 3 3 0
Engine-divided protractors, from 0 12 0
Improved German silver beam compass 1 10 0
Proportional ditto, fully divided 1 2 6
Tubular compasses 1 10 0
Napier ditto 1 5 0
Pillar ditto 1 0 0

[2854]

BARNETT, JOHN, 3 *Whitehall Street, Tottenham*.—Microscopic preparations.

[2855]

BEALE, PROFESSOR, F.R.S., *London*.—Microscopes for class demonstration ; microscopical specimen of animal tissue, nerves, vessels, &c.

[2856]

BELLHOUSE, WILLIAM DAWSON, 1 *Park Street, Leeds*.—Medical galvanic apparatus, containing primary, secondary, and combined currents.

[2857]

BENIHAMS & FROUD, 40, 41, & 42 *Chandos Street, Charing Cross*.—Platina apparatus for chemical uses.

[2858]

BESTALL, WILLIAM, 1 *Victoria Cottage, Royal Road, Kennington Park*.—Apparatus for showing the beautiful phenomenon of polarized light.

[2860]

BLIGH, JOHN, 30 *Charles Street, Berkeley Square, W.*—Sensitive thermometer, and self-acting ventilator.

[2861]

BOLTON & BARNITT, 146 *Holborn Bars*.—Chemical, galvanic, and pneumatic apparatus.

[2862]

BRAHAM, JOHN, *Bristol*.—Spectacles from earliest dates ; patented anti-ophthalmoscopic, rifle, and sporting spectacles ; helical spring eye-glasses.

The exhibitor's improved pantoscopic and anti-ophthalmoscopic spectacles, spherical eye-preservers, rifle and sporting spectacles, and helical spring eye-glasses (protected by letters patent of Her Majesty the Queen and

the Emperor of the French, granted August, 1861), may be obtained, wholesale and retail, from himself and from licensed agents in all towns of the United Kingdom.

[2863]

BRETT, JOHN WATKINS, 2 *Hanover Square*.—Submarine telegraph cables successfully established by the inventor ; Roman type-printing telegraph.

[2864]

BRITISH AND IRISH MAGNETIC TELEGRAPH COMPANY, *Liverpool*.—Telegraph instruments, insulators, and apparatus ; submarine telegraph cables. (*See page 4.*)

[2865]

BRITISH ASSOCIATION, *Kew Observatory*.—Philosophical instruments.

[2866]

BROWN, DAVID STEPHENS, *Eton Lodge, Ashby Road, Islington, London*.—Self-acting sympiesometer ; portable barometer ; sensitive sympiesometer.

[2867]

BUCKINGHAM, JAMES, Civil Engineer, *Walworth Common, London*.—Refracting telescope, equatorially mounted, 20 inches aperture ; portable ditto, 5 inches aperture.

1. Equatorial Refracting Telescope (in the Nave), 28½ ft. focus and 20 inches aperture ; believed to be the largest existing ; all the clamps and slow motions in right ascension and declination are at the eye-end, where also the declination circle is read.

2. Portable Equatorial (in the North Gallery), 7 ft. focus, 5½ in. aperture, circles 11½ in. diameter, graduated on platina, adjustable to latitudes 30° to 60°, having entire motion in azimuth to facilitate placing in position : can be used as a transit.

3. Very delicate Level, without adjustment, divided to seconds of space.

4. Micrometer, divided on platina, with new method of illuminating by prisms.

5. Object Glasses of 2½, 3½, 5½, 9, and 20 in. clear aperture ; and one 8¼ in. on the dialytic system.

None of these instruments are for sale ; they are exhibited only to show the convenience and novelty of the fittings. The object glasses, which are free from chromatic and spherical aberration, were made for the exhibitor by William Wray, Optician, 1 Clifton Villas, Upper Holloway, N.

BRITISH AND IRISH MAGNETIC TELEGRAPH COMPANY, *Liverpool*.—Telegraph instruments, insulators, and apparatus; submarine telegraph cables.

The following patented inventions are exhibited :—

THE ACOUSTIC TELEGRAPH INSTRUMENT. Sir C. T. and E. B. Bright's patents, 1855—1860. The acoustic instrument conveys signals to the ear instead of to the eye of the operator. Two bells are used of different tone, and muffled so as to prevent prolonged vibration. A single conducting wire only is employed, a relay being used to connect up a local battery on a positive current being received with one bell, or if a negative current with the other bell. This apparatus is used at all the principal stations of the Company. It is not liable to get out of order, and utilizes both currents, besides saving the cost of a writing clerk, required at each instrument when visual signals are used.

THE MAGNETIC TELEGRAPH INSTRUMENT. Henley's patent, 1848. In this invention the magneto-electric current is applied in place of a galvanic battery. It is used extensively by the Company for railway telegraphs and other purposes, and is peculiarly applicable to hot climates, where it is found very difficult to keep galvanic batteries in order.

THE NEEDLE TELEGRAPH. Edward Highton's patent, 1848. This is a simple form of visual telegraph, requiring only one wire, and is extensively used by the Company for railway telegraphs and other purposes.

THE TRANSMITTING INSTRUMENT. Sir C. T. and E. B. Bright's patent, 1852. This is a relay, so constructed that when connected to a single wire, at an intermediate point, it will act as a relay to transmit a positive or negative current at will in either direction.

RESISTANCE COILS, for testing the position of a fault in telegraph conductors from a distant station. Sir C. T. and E. B. Bright's patent, 1852.

VACUUM LIGHTNING PROTECTOR. Ditto, ditto, ditto. In this invention the resistance of the air to the passage of electricity, between the points of the conductor, may be exactly regulated by partial exhaustion of the chamber in which the points are placed, so as to allow lightning to pass freely from the wire to earth without entering the telegraph instrument or cable, etc., to which this apparatus is connected. The points are at the same time preserved from dust.

MERCURIAL RELAY AND RECORDING APPARATUS. Sir C. Bright's patent, 1862. In the relay a fine stream of mercury, or other conducting fluid is employed; contact being made by a magnetic needle or its arm passing through the stream. The use of a metallic spring or pin is thus dispensed with, rendering the relay exceedingly sensitive and speedy in its action.

APPARATUS for compensating for the variations in force of currents sent and different length of pauses on long lines of telegraph, and RECORDING APPARATUS used for determining the variation of currents, showing the rise and fall in the wire, and registering any currents of terrestrial magnetism. Sir C. Bright.

SHACKLES and SWIVEL INSULATORS, for use round sharp curves and where great stretches of wire are required. Sir C. T. and E. B. Bright's patents, 1852 and 1858. Employed extensively in London and elsewhere for the overhouse telegraphs.

SPECIMENS of the Company's two Irish cables, containing six wires each, laid 1853—4, and collection of other cables. Specimens of concrete on cable.

ISULATORS ON ARMS, of different lengths. Sir C. T. and E. B. Bright's patent, 1852. The wires are so arranged as to avoid contact if one or more break.

[2868]

BURROW, W. & J., *Great Malvern*.—Malvern landscape and target telescopes. (*See page 5.*)

[2869]

BURTON, EDWARD, 47 *Church Street, Minories, London*.—Optical and mathematical instruments.

[2870]

BUSS, THOMAS ODEMCY, 3 *Upper East Smithfield, Tower Hill*.—Hydrometers and saccharometers for fluids.

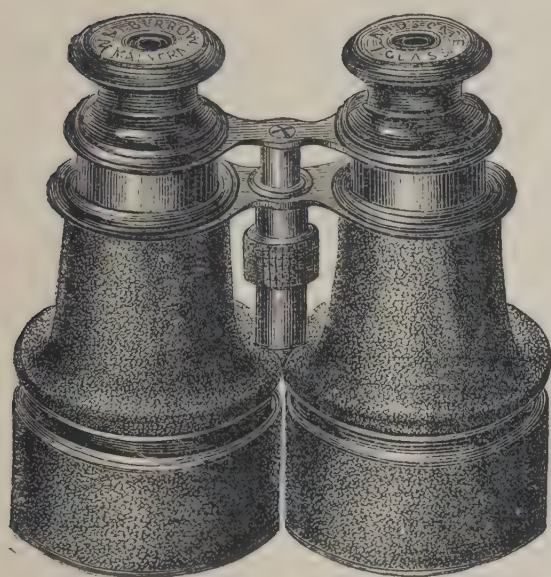
[2871]

BUTTERS, THOMAS E., 4 *Belvedere Crescent, Lambeth*.—Parallel glasses for mathematical instruments.

[2872]

CAMERON, PAUL, Mathematical Instrument Maker, *Glasgow*.—Marine compass; marine barometer; instruments for determining ships' position at sea.

BURROW, W. & J., *Great Malvern*.—Malvern landscape glasses and target telescopes.



This drawing represents a "BURROW'S LANDSCAPE GLASS," containing twelve lenses constructed of the purest glass, in such combinations as to produce high power and accurate definition with wide and brilliant field.

These glasses are achromatic, and are made in two sizes, price 6 guineas and 3½ guineas respectively, sling included.

The 6 guinea glass will show hits on a target at 500 yards, distinguish colours on the race-course at a mile, and define objects in a landscape and ships at sea at 15 to 20 miles. Size 4½ in. × 4½. Diameter of object-glasses, 2 inches.

The 3½ guinea glass will do the same at 400 yards, ¾ of a mile, and 10 to 12 miles. Size 3 in. × 4½. Diameter of object-glasses, 1½ inches.

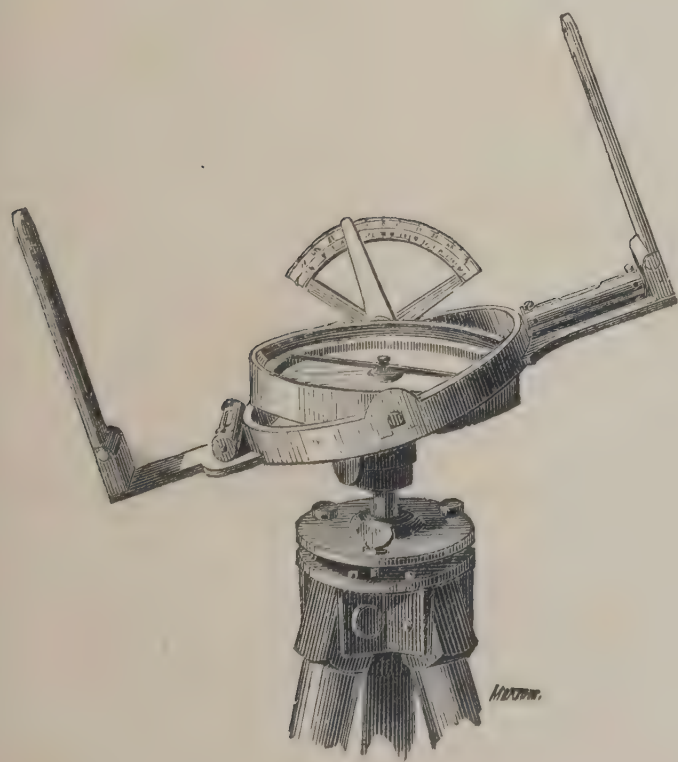
References to noblemen, distinguished officers in the army and navy, sportsmen, travellers, scientific men, racing judges, &c., who use these glasses in preference to field glasses of the ordinary make.

BURROW'S TARGET TELESCOPE for rifle practice will show hits on the target at the long ranges. Length 7 inches; weight 3 ounces. Price, 25s.; covered Russia, 30s.—For centres at 1000 yards, 3 guineas.



[2873]

CASARTELLI, JOSEPH, 43 *Market Street, Manchester*.—Microscopes; telescopes; mining and surveying instruments.



	£	s.	d.
1. Astronomical telescope, 3½ inches aperture, equatorially mounted, with movable axis for setting to different latitudes, suitable for either a pillar or portable stand	50	0	0
2. Astronomical telescope, 3½ inches aperture, mounted on a firm portable stand; fine and coarse horizontal and vertical movement	40	0	0
3. Large size, first-class microscope, stand, two eye-pieces, pliers, forceps, &c. &c.	20	0	0
4. A new arrangement of circumferenter, or miner's dial, of first-class quality, with sights mounted on movable plate for sighting up or down inclines, with quadrant attached, showing the degree of inclination, &c. (<i>See illustration</i>)	14	14	0
5. Ditto, as above, smaller size	14	0	0
6. Circumferenter or miner's dial, with tangent screw adjustment of first-class quality	13	10	0
7. Best 14 inch dumpy level, with compass	14	14	0
8. Portable anemometer (invented by J. Dickenson, Esq., Government Inspector of Mines) for showing the velocity of air current in coal mines, by which can be computed the quantity of air, in cubic feet, passing per minute through the airways	2	10	0
8. Steam-engine indicator, for taking diagrams, showing the working of the engine, and computing the power exerted	6	6	0
9. Steam-engine indicator as above, small size	5	5	0
10. Vacuum gauge for indicating the state of the vacuum in the condenser of the steam-engine	3	10	0
11. Patent steam-pressure gauge	3	5	0

[2874]

CASELLA, LOUIS P., 23 *Hatton Garden*.—Mathematical, philosophical, surveying, reliable, popular, and standard and meteorological instruments.

[2875]

CHADBURN BROTHERS, *Nursery, Sheffield*.—Spectacles, telescopes, microscopes, reading-glasses, optical lenses, &c.

[2876]

CHANCE BROTHERS, *Birmingham*.—Dioptric sea lights and lanterns.

[2877]

CHATTERTON, T., 14 *King's Terrace, Bagnigge Wells Road*.—Barometers.

[2878]

CLARK, GEORGE, 30 *Craven Street*.—Improvements in manufacturing, connecting, laying, and raising electro-telegraphic cables.

[2879]

COOK, JAMES EDGAR, 22 *Mearns Street, Greenock*.—Damp and water resisting mirror—patented.

[2880]

COOKE, THOMAS, & SONS, *Buckingham Works, York*.—Telescopes, equatorials, transit instruments, altazimuth instruments, theodolites, levels, &c.

[2881]

CHEYNE, J. B., & MOSELEY.—Recording apparatus, to serve as a check upon signal-men, engine-drivers, and others.

[2882]

COX, FRANCIS B., 50 *Camden Street, Birmingham*.—Box and ivory rules; Carrett's, Hawthorn's, and Routledge's engineers' rules; English and foreign rules.

[2883]

COX, FREDERICK J., 22 *Skinner Street, London*.—Dissolving views and apparatus, with various methods of illumination.

VERTICAL DISSOLVING VIEW APPARATUS, 1½ inch condensers, oxy-hydrogen jets, clockwork motion to lime cylinders, gas-bags, and generator; price 40*l*.

APPARATUS FOR EDUCATIONAL PURPOSES, 3½ inch condensers, oxy-hydrogen jets, and gas generator; price 22*l*.

Specimens of suitable views.

Various forms of Oxy-Hydrogen Jets.

OXY-CALCIUM LAMPS, the light produced by passing a stream of oxygen through the flame of a spirit lamp.

[2884]

CRABBE, REV. GEORGE, *Merton Rectory, Thetford*.—Cheap meridian instrument, showing solar time at noon within one second.

[2885]

CRONMIRE, J. M. & H., 10 *Bromehead Street, Commercial Road East*.—Mathematical instruments.

[2886]

CUTTER, WILLIAM G., *Crystal Palace, Sydenham*.—Stereoscopes decorated with ivory debuscopes, and folding reflectors for designers.

[2887]

CUTTS, J. P., SUTTON, & SON, Opticians to Her Majesty, 43 *Division Street, Sheffield*.—Optical, mathematical, and philosophical instruments.

Specimens of coloured and white crown glass, best plate glass, achromatic flint glass, and metals used in the construction of achromatic object glasses, for telescopes, microscopes, and cameras.

Crown and flint discs used in the construction of the best quality of achromatic object glasses for telescopes.

A block of achromatic flint lenses, ground and polished by hand to the required radius.

A block of white crown lenses, ground and polished by hand to the required radius.

An achromatic object glass of best quality, composed of flint and crown glass, the inner surfaces of which are cemented together with Canada balsam.

Lump of plate glass.

Rough plate glass of various thicknesses and diameters, rounded ready for grinding by machinery to the curves required.

Flint glass cast in the form of a plano-convex lens, for the purpose of being ground to the radius of the tool in which it was cast. When ground and polished, they are mounted in brass cells with a plano-convex lens of plate glass, and form the condensers for a phantasmagoria lantern.

Lump of Brazilian pebble, from which slabs are cut and ground into spectacle eyes.

Specimens of extra white and coloured glass, cut and rounded for spectacle eyes to be ground by machinery.

Tray containing specimens of white and coloured spectacle eyes, ground and finished ready for mounting into spectacle frames.

Double convex and plano-convex lenses in different stages of manufacture. The exhibitors can grind any diameter from $\frac{1}{16}$ to 16 in., and any focus from $\frac{1}{40}$ to 72 in. They produce yearly over 10,000 dozen lenses.

Tray containing a variety of double convex and plano-convex lenses from $\frac{1}{40}$ in. focus and $\frac{1}{16}$ in. diam. to 3 in. focus $2\frac{1}{2}$ in. diam., suitable for microscope and telescope work.

Samples of perspectives and telescopes with four lenses.

Portable achromatic telescopes with mahogany, leather, and whalebone bodies.

Portable achromatic telescopes with bronzed mounts and draws for deer-stalking.

Portable achromatic telescopes, with German silver mounts and draws.

Portable achromatic telescopes, with silver-plated mounts and draws, fancy wood or leather bodies, and lenses of warranted quality.

Achromatic day and night ship telescopes, with wood, leather, and corded bodies.

Improved taper achromatic navy, yacht, and mast-head telescopes, with leather bodies and shades, and short draws.

Double screw taper clip stand, suitable for the above, to screw into mast, &c.

Achromatic telescopes, on brass stands, with and without rack adjustment, for astronomical observation.

Opera and marine glasses of all kinds.

Provers (pillar and holding) for linen and cloth.

Simple and compound microscopes, with the latest improvements. Magic lanterns and sliders.

Sets of lenses, in brass mounting, for phantasmagoria lanterns.

Stereoscopes, patent achromatic, with and without rack adjustment. Sextants and quadrants.

Barometers, aneroid and metallic, and stands for ditto.

Pocket compasses and sun-dials.

Magnets—horseshoe, straight bar, and parallel, with brass wheel. Needles only, for ships' compasses.

Samples of boxwood and ivory.

Scales and rules, parallels, &c.

Samples of every description of spectacle in iron, steel, horn, shell, silver, and gold.

Horn box readers, burners, and magnifiers.

Horn, brass, German silver, mahogany, and rosewood picture glasses, from $1\frac{1}{4}$ in. to 13 in. diam. Any focus can be supplied.

Shell and horn double fiddle pattern microscopes, fitted with plano-convex lenses.

Full catalogue and prices of articles exhibited and manufactured by the exhibitors may be had on application at their works.

[2888]

DALLMEYER, J. H., 19 *Bloomsbury Street, London, W.C.*—Telescopes, microscopes, photographic lenses, apparatus, &c. (*See pages 8 & 9.*)

[2889]

DANCER, J. B., *Manchester*.—Binocular and monocular microscope; microscopic photographs; micrometers; equatorial telescope; dissolving view lantern.

The exhibitor is a manufacturer of the following instruments, &c., of which he has always a large stock on hand, viz. :—

Monocular, binocular, and dissecting microscopes.

Photographic micrometers.

Astronomical telescopes, with equatorial mountings

and plain stands. Tourists' telescopes. Opera-glasses. Spectacles and eye-glasses in gold, steel, and shell.

He also manufactures and repairs philosophical instruments in general, and supplies the public and the trade with microscopic photographs and other objects.

[2890]

DARKER, WILLIAM HILL, 9 *Paradise Street, Lambeth*.—Illustrations of action of polarized light on crystalline and other bodies.

[2891]

DAVIS, E. & J., 1 *Albion Street, Leeds, and Derby*.—Two coal dials; three anemometers; two pressure gauges; one vacuum gauge, oil tap, cistern, and steam thermometers; indicator; flax tester.

Hedley's dial, with angular motion, for coal pits and mines. Vernier dial for ditto.

Davis' pressure gauge in skeleton.

Ditto, ditto, commercial ditto.

Ditto, vacuum ditto.

Anemometers for regulating the ventilation of coal pits.

Cistern and steam thermometers.

Level. Self-closing oil tap.

Testing machine for yarns and fibrous substances.

DALLMEYER, J. H., 19 *Bloomsbury Street, London, W.C.*—Telescopes, microscopes, photographic lenses, apparatus, &c.

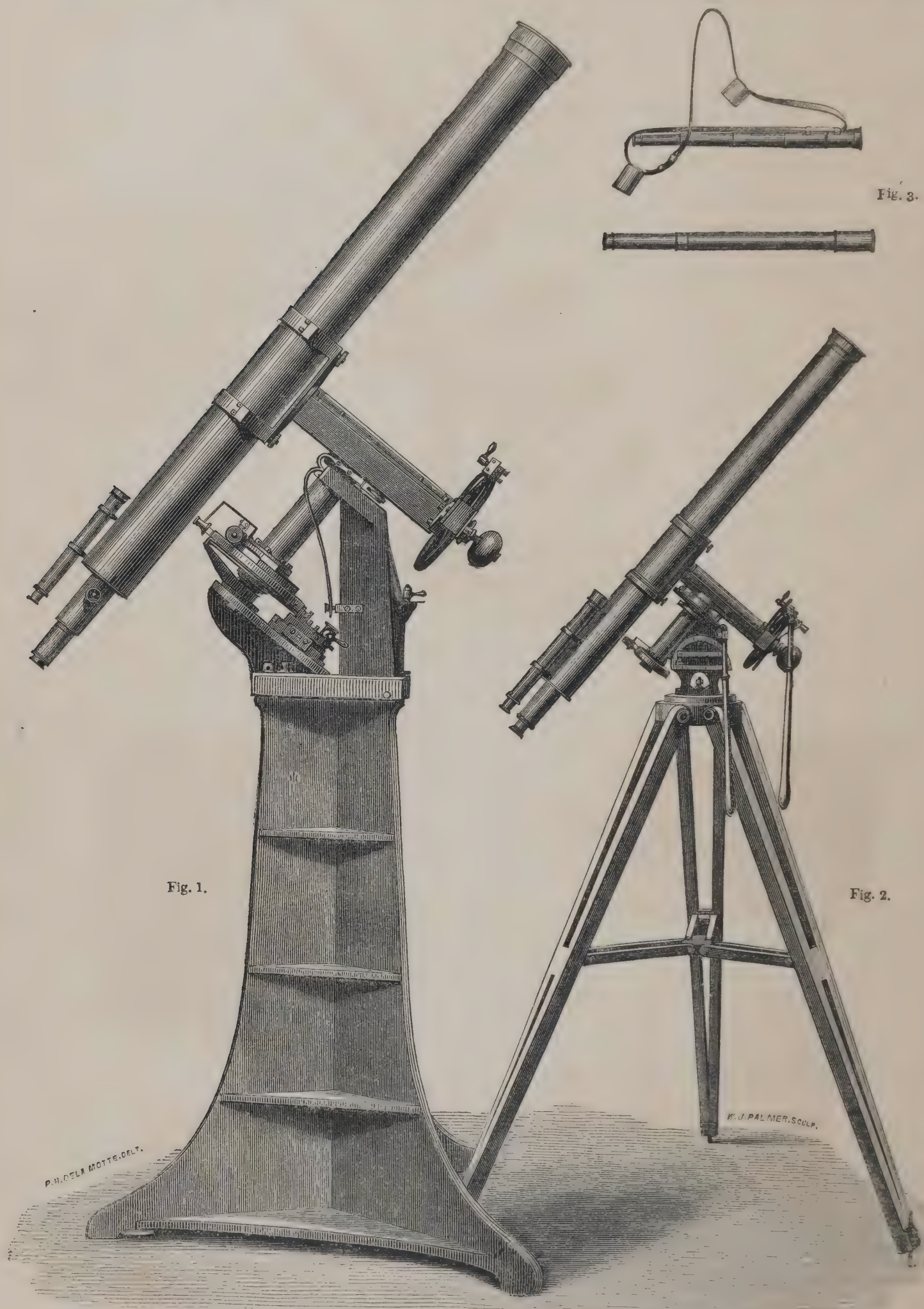
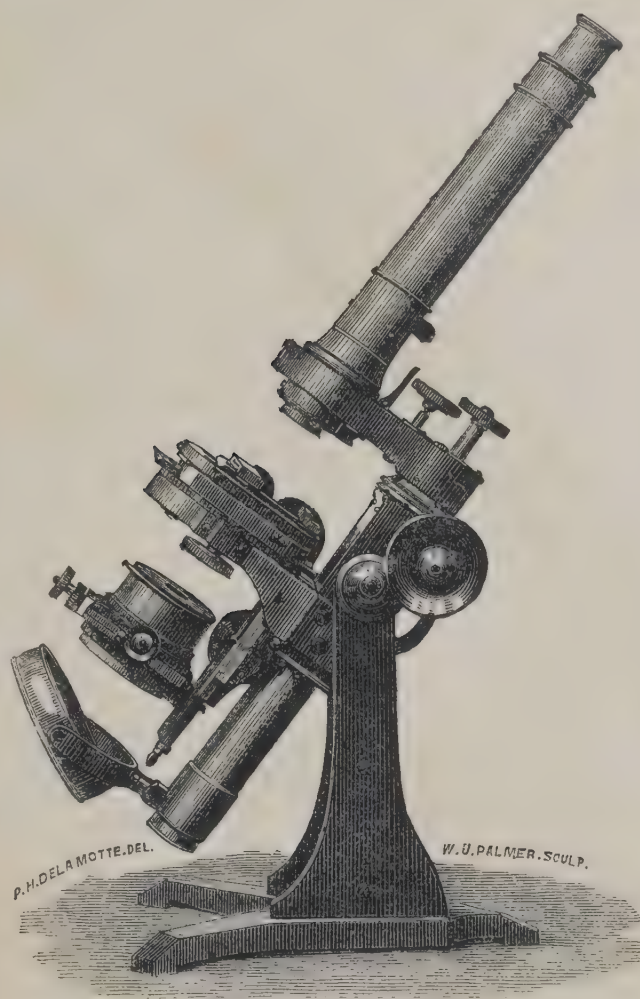


Fig. 1. Fixed equatorial, with clock-work. Fig. 2. Universal portable equatorial. Fig. 3. Terrestrial telescopes, naval, reconnoitring, deer-stalking, etc. (Exhibited in the Nave.)

DALLMEYER, J. H.—*continued.*

The engraving is a representation of the general form of Dallmeyer's microscopes. They are manufactured of four different dimensions. Each of these instruments is composed of several distinct parts, and the simple stand of each size forms the basis of a complete instru-



No. 1A MICROSCOPE.

ment to which any of the other parts may be added subsequently.

ACHROMATIC OBJECT-GLASSES.

The first of a new series of objectives was exhibited at the Soirée of the London Microscopical Society, in March, 1860.

Fig. 1

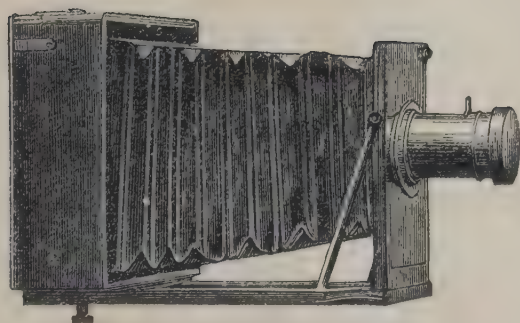


Fig. 2.

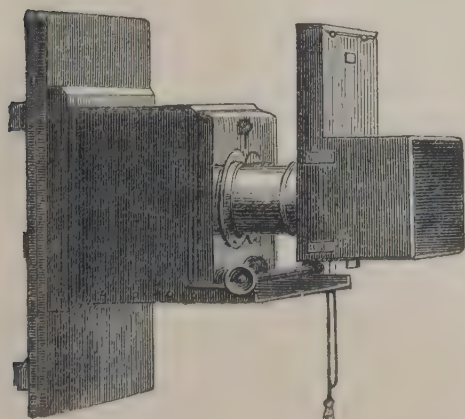


Fig. 1.—The new Dallmeyer Triple Achromatic Lens, and a Bellows Camera.

Fig. 2.—A pair of quick-acting portrait Lenses, specially constructed for taking album pictures, attached to a camera and shutter of new design.

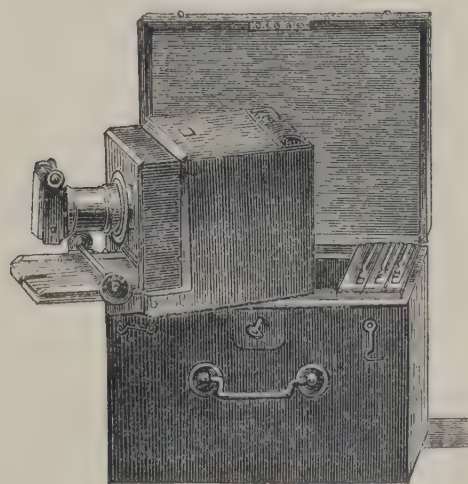


Fig. 3.

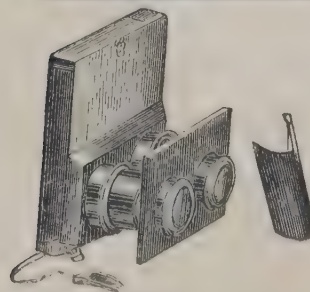


Fig. 3.—A pair of Dallmeyer's new Stereoscopic Lenses, and a No. 1 Triple Achromatic Lens. Also a travelling Stereoscopic Camera, with which, on removing the central partition, full-sized pictures on plates $7\frac{1}{4} \times 4\frac{1}{2}$ can be taken. (Exhibited in Class XIV.—No. 3069.)

[2892]

DE GRAVE, SHORT, & FANNER, 59 *St. Martin's-le-Grand*.—Hydrostatic assay balances, scales and weights for diamonds, bullion, &c.

[2893]

DE LA RUE, WARREN, Ph.D., F.R.S., *Observatory, Cranford*.—Lunar, solar, and planetary photographs; photographs of the solar eclipse of July 18th, 1860. (*See page 11.*)

[2894]

DENT & Co., 61 *Strand*, and 34 & 35 *Royal Exchange*.—Ship and azimuth compasses and diploidoscopes.

[2895]

DESVIGNES, MR., *Lewisham, S.E.*—Mimoscope, patented: an instructive philosophical toy, affording endless variety and amusement.

[2896]

DUNCAN, CHARLES STEWART, *Monmouth Road, Bayswater*.—Ratan deep-sea electric telegraph cable.

[2897]

ELLIOTT BROTHERS, 30 *Strand, London*.—Philosophical, mathematical, optical, and surveying instruments.

The model of a new magneto-electric propeller, invented and exhibited by Harry Whiteside Cook, Esq., of Rossall Hall School, is intended merely to demonstrate the principle.

In practice the compound core would of course be flexible. The battery is intended to be carried by the propeller.

The force employed is that known as the axial force.

The electric contact being broken at the moment this power reaches its maximum, the momentum imparted is sufficient to carry the propeller and its train within the influence of a second magnetizable portion of the core, when the contact is again renewed and again broken. The result of this alternation is found to produce a continuous and indefinitely rapid rate of progression.

[2898]

FORBES, R. C., 95 *Warwick Street, Liverpool*.—Artificial horizon for observing altitudes in hazy weather.

[2899]

FRITH, PETER, & Co., *Sheffield and London*.—Optical instruments.

The following are exhibited :—

IMPROVED SPECTACLES.

Concave, convex, and meniscus spectacle lenses. Military, marine, and tourists' telescopes. Achromatic microscope and telescope objectives.

MICROSCOPES.

Woollen and linen provers. Twin photographic stereoscopic view lenses. Camera lucida right angle and compass prisms. Riflemen's telescopes. Exhibition opera-glasses, lenses, &c. Astronomical and surveying instruments made to order.

[2900]

GLASS, ELLIOTT, & Co., 10 *Cannon Street, London*; Manufactory, *East Greenwich*.—Submarine electric telegraph cables.

[2901]

GODDARD, JAMES THOMAS, *Whitton, near Hounslow*.—Cloud mirror and sunshine recorder.

[2902]

GOWLAND, GEORGE, *Liverpool*.—Vertical and semi-vertical compasses, with circular magnets; sextants with artificial horizon, and binocular glasses.

[2903]

GREEN, SAMUEL, & SON, 7 *Helmet Row, Old Street, London*.—Pocket compasses and sundials.

DE LA RUE, WARREN, Ph.D., F.R.S., *Observatory, Cranford*.—Lunar, solar, and planetary photographs; photographs of the solar eclipse of July 18th, 1860.

A series of Astronomical Photographs, comprising photographs of the several phases of the total eclipse of July 18, 1860, taken at Rivabellosa, near Miranda de Ebro, in Spain; photographs of the moon in her different phases, taken at Mr. De la Rue's observatory at Cranford; photographs of a lunar eclipse; photographs of Jupiter and of Saturn and the moon, taken together, just after the occultation of Saturn by the moon, also obtained at Cranford.

Nos. 1 to 31 inclusive show (as seen direct, that is, not inverted) the several phases of the total solar eclipse, the irregularity of the moon's edge being very apparent in the several pictures. These pictures were obtained by means of the Kew Heliograph, an instrument contrived by Mr. De la Rue for taking sun-pictures, at the suggestion of Sir John Herschel to the Royal Society, whose property it is. The Kew instrument was transported to Bilbao, in Spain, on the occasion in question, by H.M. steam ship *Himalaya*, and thence to Rivabellosa, over the Cantabrian Pyrenees,* with the co-operation of Mr. Vignoles, C.E. Mr. De la Rue's party, consisting, besides himself, of Mr. Beckley, Mr. Reynolds, Mr. Downes and Mr. E. Beck, formed one section of the *Himalaya* expedition organised by the Astronomer Royal, Mr. Airy.

The pictures having the greatest interest are those taken during the totality, in which may be seen the luminous prominences. These prominences, it is now known, belong to the sun, and it may be regarded as certain that they project at all times beyond the solar surface; but they only become visible during a total solar eclipse, because on all ordinary occasions their light is less bright than that of our own atmosphere illuminated by the sun's rays. A paper on the results of the photographic expedition to Spain has been read by Mr. De la Rue to the Royal Society, as the Bakerian lecture of the present year. It is shown in this paper that the phenomena depicted by the photographs completely establish the view that the luminous prominences really belong to the sun, and that they are not occasioned by any action of the moon's edge on light coming originally from the sun.

Nos. 32 to 45 inclusive show the different phases of the moon, and bring prominently under view the wonderful craters which cover the greater portion of the surface of our satellite, especially in the upper or southern hemisphere (the pictures are as seen in an inverting telescope). Conspicuously visible is the crater Tycho, from which radiate a series of furrows like lines of longi-

tude on a globe; lower down on the right is Copernicus. These pictures, about eight inches in diameter, are enlarged by means of a camera from negatives 1 inch in diameter, as seen in No. 53. It must be borne in mind that, during the taking of these pictures, the moon is in motion with respect to the observer, so that the telescope has to be made to follow her motion very exactly indeed to secure such perfect pictures, which are still sharp although magnified eight times linear.

Nos. 46 to 49 are photographs of the lunar eclipse of February 27th, 1858; No. 46 being the moon just before the commencement. It will be observed how indistinct is the boundary of the earth's shadow in 47, 48, and 49.

Nos. 50 and 51, photographs of Jupiter, enlarged from the original negatives.

No. 52, a photograph of the moon and Saturn, taken together just after the occultation of that planet by the moon on May 8th, 1859; the planet Saturn is surrounded by a black circle to indicate its position on the plate.

No 53, an original lunar negative.

The several lunar and planetary photographs were taken with a reflecting telescope of 10 feet focal length and 13 inches aperture, made by Mr. De la Rue, and erected at his observatory at Cranford, Middlesex.

No. 55, a moving model to illustrate the phenomena of the total solar eclipse.

No. 56, stereoscopic view of the moon, 2 inches in diameter.

No. 57, stereoscopic view of the moon, 8 inches in diameter.

These stereoscopic views are produced by placing in the stereoscope two views of the moon, taken under different circumstances of libration. By observing the position of the crater Tycho in the collection of photographs, it will be seen that it is sometimes nearer to, sometimes further from, the moon's edge; by selecting two pictures we can obtain such as have the proper stereoscopic relation.

No. 58, a stereoscopic view of Saturn, produced by reducing two hand-drawings made at an interval of four years. The exact coincidence of these drawings in the stereoscope is an evidence of their accuracy.

No. 59, solar spots, printed by the ordinary typographical press from a copper block, produced by means of light and electro-metallurgy, by M. Paul Pretsch, from an original negative, taken at Cranford, on a scale of 3 feet to the sun's diameter. The printing block is absolutely untouched by the graver.

* The district may be seen in Mr. Vignoles' model, exhibited in the department of "Civil Engineering," which does not, however, quite extend to Rivabellosa.

[2904]

GRIFFIN, JOHN JOSEPH, F.C.S., 119 *Bunhill Row, London, E.C.*—Chemical and philosophical instruments, and their applications.

[*Obtained a Prize Medal in Class X. at the Exhibition of 1851.*]

Gas-burners, constructed to produce great heat, without light, for chemical use :—

A.—GAS BURNERS WITHOUT BELLOWS.—Three sizes. Each gives a single flame, when a solid substance is to be heated, and a number of small flames when liquids are to be boiled or evaporated. Suitable jackets or furnaces, made of fire-clay and iron, are provided, to concentrate and economize the heat.

B.—BLAST GAS FURNACES.—These consist of multiple blowpipe gas burners, blowing machines, and fire-clay furnaces filled with flints. The heat they produce will melt silver, gold, copper, cast iron, nickel, cobalt, and wrought iron. A large size will fuse 25 lbs. of cast iron in about an hour. They produce no smoke.

C.—GAS FURNACE FOR TUBES.—Will heat tubes of glass, porcelain, or iron, up to 36 inches long, to bright redness in a few minutes. The heat can be easily reduced and regulated for the whole length, or at any part, in order to adapt it to combustions in organic analysis.

Collection of graduated apparatus for centigrade testing, containing everything necessary for the preparation of the test liquors, or their use in volumetric analysis. In a mahogany cabinet.

Assortment of graduated instruments for testing in the arts, namely—alcalimeters, acidimeters, hydrometers, thermometers, alcoholometers, saccharometers, eudiometers, and liquid measures.

Collection of chemical apparatus and tests, suitable for a physician, or for a hospital laboratory, containing everything necessary for the detection of poisons, the analysis of urine, the testing of medicines, and the performance of many other chemical operations that occur in medical practice. In a mahogany cabinet.

Collection of chemical apparatus and tests suitable for a travelling engineer, a miner, or a naval or military officer; comprehending whatever is necessary for the qualitative analysis of minerals, ores, or chemical and medical compounds generally; being the collection described in the "*Admiralty Manual for Scientific Enquiry.*" In a strong mahogany cabinet.

Colonial Chemistry.—A collection of apparatus for testing cane juice, to determine the exact quantity of lime necessary to clarify it. Also, Twaddell's hydrome-

ters, and Baumé's hydrometers, saccharometers, and alcoholometers, graduated at 84° Fahr., to suit West Indian liquor lofts.

Collection of apparatus and tests for the examination of minerals, ores, and chemicals, by the blowpipe. In a portable cabinet.

Elementary collection of chemical apparatus and preparations for the use of young chemists. In portable cabinets; several sizes.

Collection of chemical apparatus, as required by each pupil for the Oxford and Cambridge Middle Class examinations.

Miscellaneous instruments for chemical researches and demonstrations, namely :—

Portable furnaces, for general chemical use; assay furnaces and assay tools.

Graham's dialyser, for effecting chemical analysis by liquid diffusion.

Still for determining the quantity of alcohol in wines; alcoholometers for testing it.

Retorts of cast iron, with movable heads, for distilling coal oils, &c.

Specimens of evaporating basins, crucibles, flasks, funnels, beakers, cut filters, test-papers, cheap balances, simple and compound blowpipes, water baths, air baths, pneumatic troughs for water and mercury, gasometers, and many patterns of supports for chemical apparatus.

Galvanic batteries, pattern cells of different constructions.

Air-pump, on Tate's plan, which has two pistons in one cylinder, and which dispenses with valves between the cylinder and the receiver, and thus gains power and accuracy. Small size, horizontal position, for screwing to a table.

Another air-pump, on Tate's plan, large size. The cylinder is placed in a vertical position, and the exhaustion is rapidly effected by a circular motion, regulated by a fly-wheel. Suitable for manufacturing purposes, or for rapid action when many experiments are to be made during a lecture.

The spectroscope, for optical experiments in chemistry, and several instruments for demonstrations and researches in other branches of chemical physics.

[2905]

GRUBB, THOMAS, *Dublin.*—Great equatorial (achromatic), 12 inches aperture; improved and perfect system of equipose throughout.

[2906]

HART, WILLIAM D., 7 *North College Street, Edinburgh.*—Electrical apparatus.

[2907]

HELY, ALFRED AUGUSTUS, 26 *Upper Albany Street, Regent's Park.*—Pocket reflecting telescope for astronomical purposes.

[2908]

HENLEY, W. T., 46 *St. John Street Road.*—Magneto-electric alphabetical telegraph.

This instrument is now coming much into use with private firms that have branch establishments; also with colliery owners; and with mill proprietors in Manchester and other large towns in the manufacturing districts, as a means of communication between their mills and warehouses. It is well adapted for railway purposes. Any person that can read can use it without any previous knowledge of telegraphy. It requires no battery, and has no complicated machinery to get out of order. The only attention required is the application of a little oil once a

month. Gentlemen engaged in business can communicate with their partners or confidential clerks at their other houses of business with the greatest facility, without the necessity of imparting their secrets to a telegraph clerk.

The instrument is represented in fig. 1, with case complete, and in fig. 2 with the case removed. The apparatus consists of two parts: that in which the current is induced, and by which it is transmitted; and that for receiving and indicating the signals. The first part is in the form of a

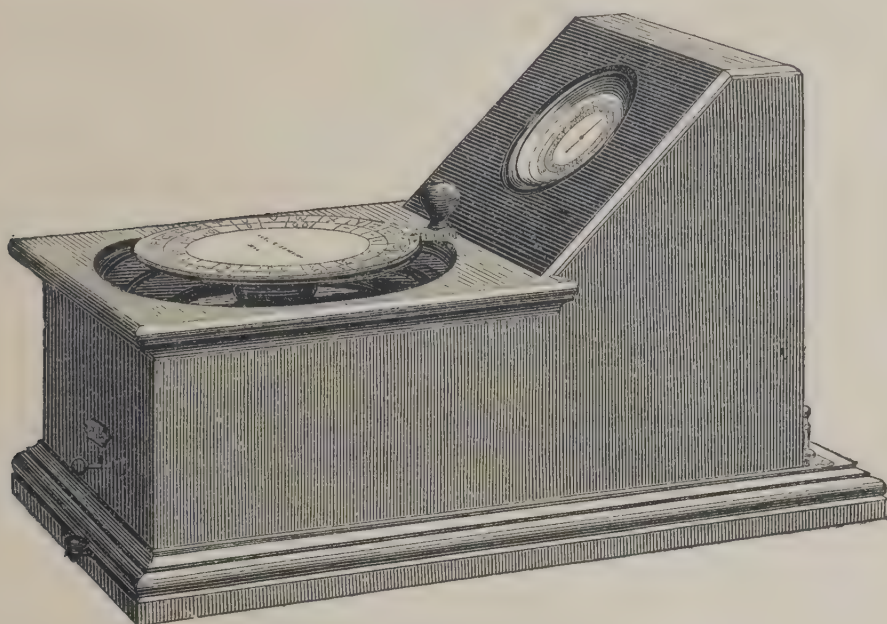
HENLEY, W. T.—*continued.*

Fig. 1.

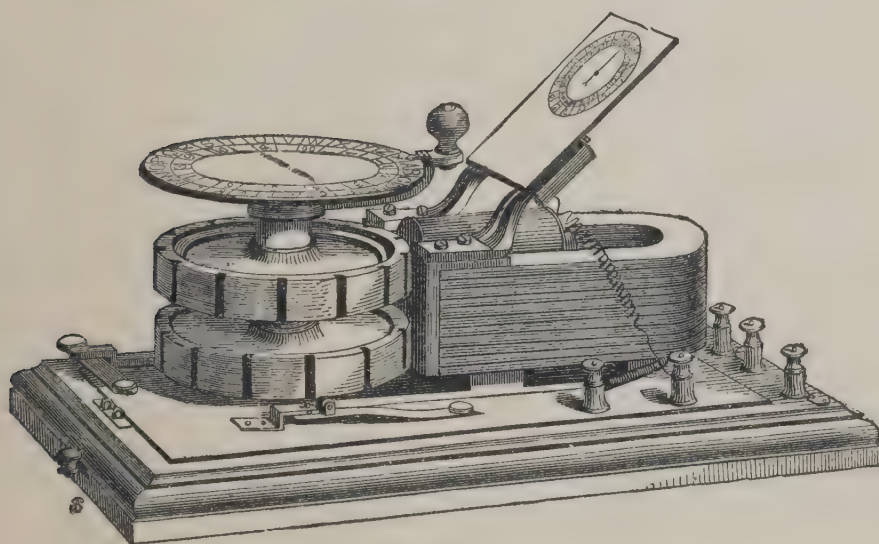


Fig. 2.

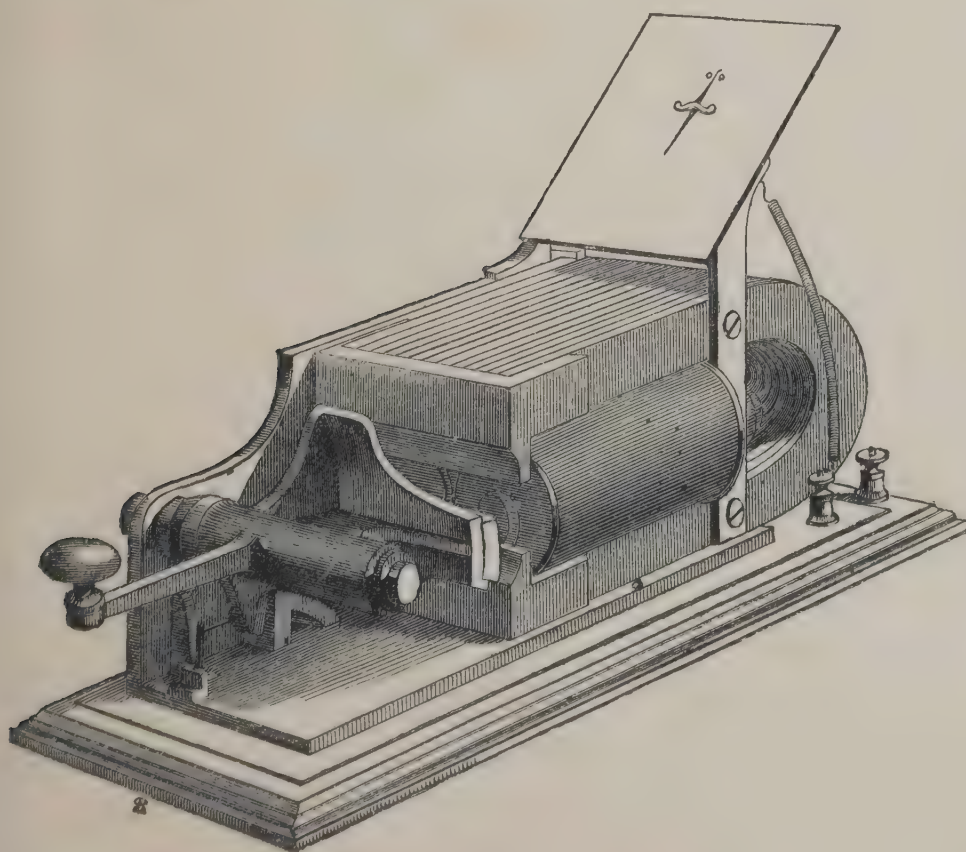


Fig. 3

horseshoe permanent magnet, with a temporary magnet or armature surrounded with coils of insulated wire placed within its poles, and a double wheel of brass revolving on a fixed axis. These wheels have on the periphery twenty-six pieces of iron, thirteen on each wheel. They are formed by turning a ring of soft iron to fit each wheel, attaching it firmly by twenty-six screws, and dividing it into thirteen pieces by the wheel-cutting engine. These pieces of iron, as they pass the ends of the permanent and temporary magnets, make a connection between the poles of each in such a way as to reverse the polarity of the latter completely at the passing of each piece, and consequently inducing a current of electricity alternately in opposite directions.

The receiving part consists of a dial with the letters of the alphabet in a circle, with a revolving index or pointer and a toothed wheel of a peculiar construction. This wheel is propelled step by step by the action of a magnetic needle, the upper end of which is formed into a pair of pallets, which act on the inclined teeth of the wheel, and the lower end oscillates in a slot formed in two pieces of iron fixed on the poles of a small electro magnet, through the coils of which the current received from the distant stations passes.

In the transmitting apparatus a dial is fixed outside of the case, on the stud on which the double wheel revolves. This has letters and figures corresponding to the receiving dial. The wheels are revolved by a handle with a knob and pointer moving round the edge of the stationary dial; and as one revolution of the wheels causes twenty-six currents of electricity to be transmitted, these will cause the wheel and index on the receiving dial to make one revolution also. It therefore follows that the two will keep time together, and whatever letter the pointer attached to the revolving wheels is made to stop at will be indicated on the receiving dial. The springs seen on the base in fig. 2 are, one for making a short circuit when receiving, so that the current may not have the resistance of the sending coils to overcome; the other is for putting the hand right on the receiving dial if it should go wrong. As these instruments have only the one moving piece of machinery, without any multiplying power cranks, cams, or other complications, and have no break pieces or current reversers (the circuit always remaining unbroken) they cannot get out of order, and the magnetism will remain the same for many years.

Fig. 3 represents a machine on a similar principle, arranged as a needle telegraph, and is also used for working the Morse printing telegraph. It has a magnet and armature as in figs. 1 and 2, but instead of rotating wheels in front of the

HENLEY, W. T.—*continued.*

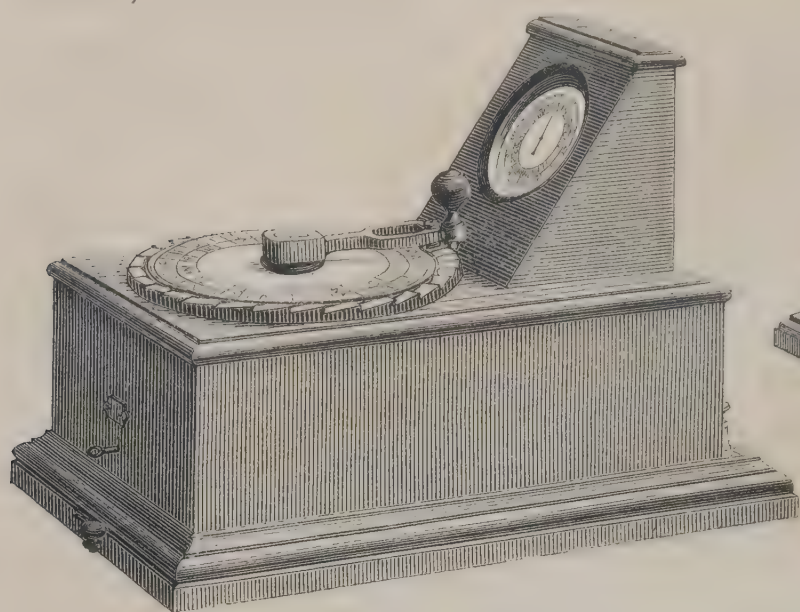


Fig. 4.

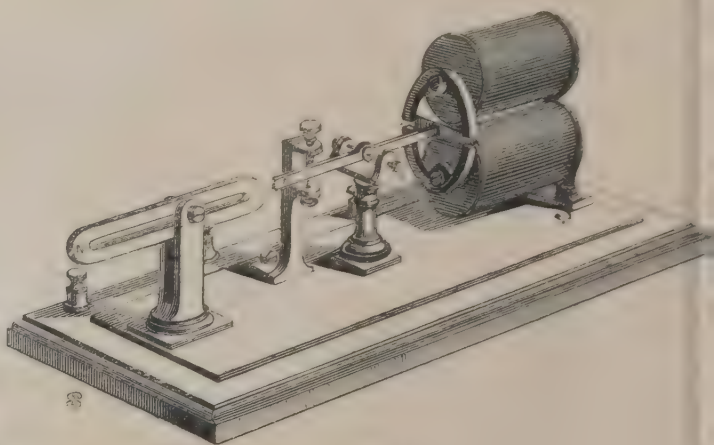


Fig. 7.

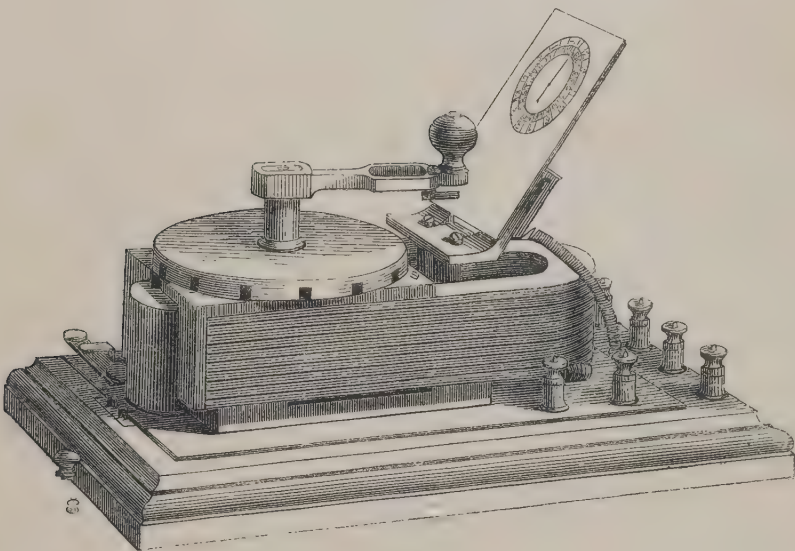


Fig. 5.

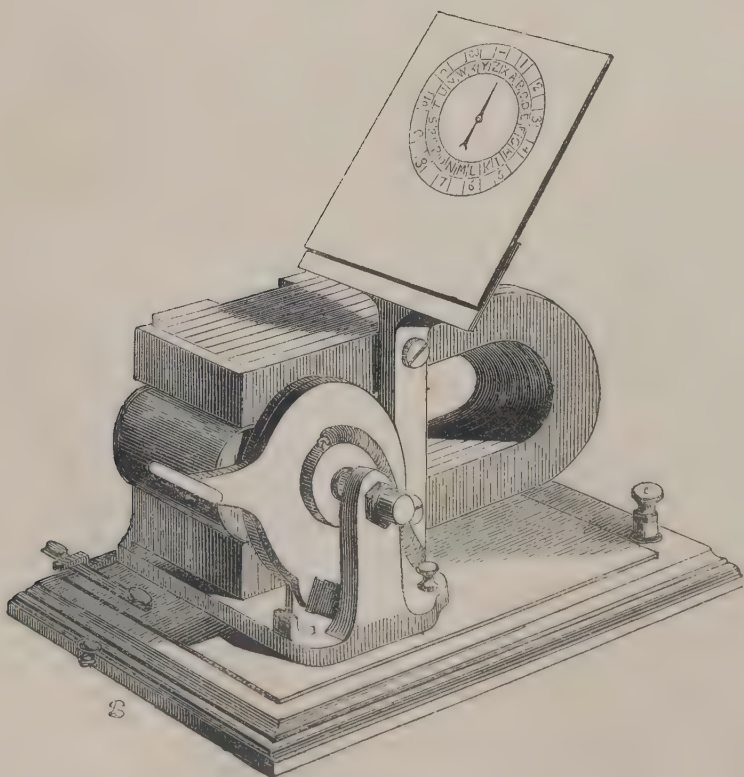


Fig. 6



Fig. 8.

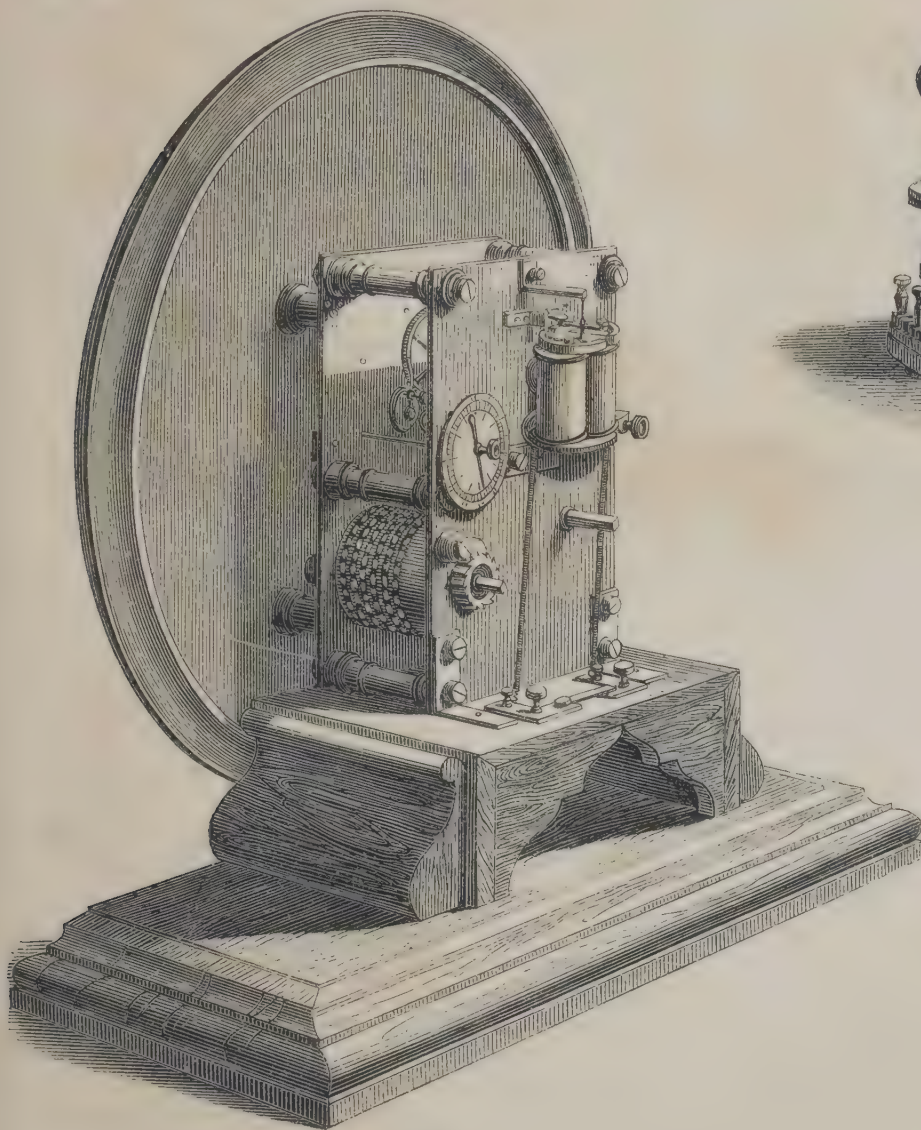
HENLEY, W. T.—*continued.*

Fig. 9.

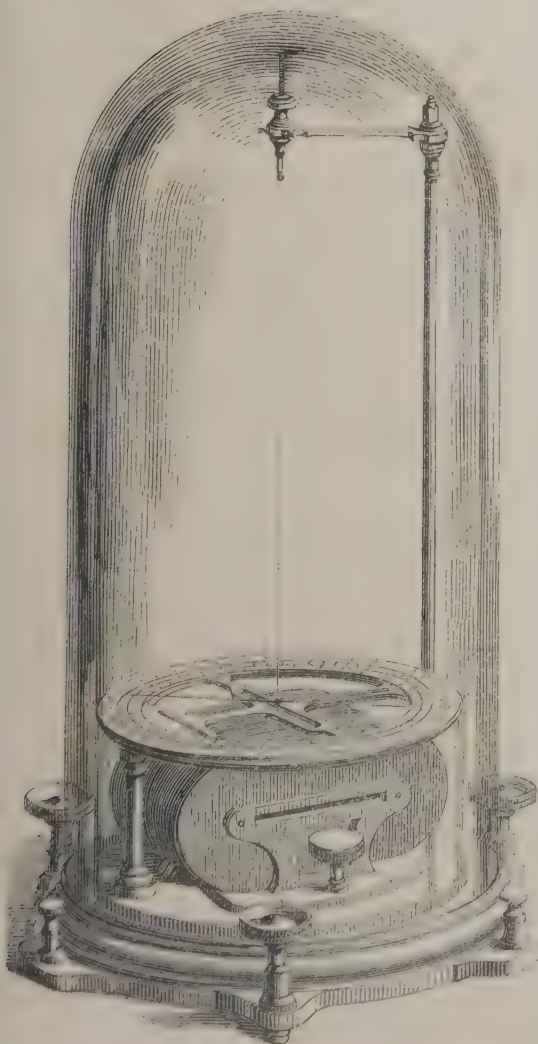


Fig. 11.

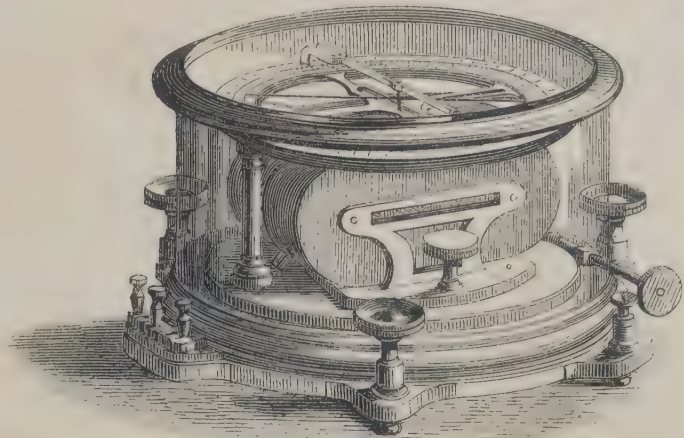


Fig. 10.

magnet it has a segment of a wheel, which is made to oscillate by a lever, the motion being limited by india-rubber stops. Every depression of the lever causes the needle on the dial to be deflected; the upward motion of the lever bringing it back again.

Figs. 4 and 5 show a modification of the letter-showing telegraph represented in figs. 1 and 2. In this case the armature is placed in a different position, and only one wheel is used, working on the upper side of the magnet. In this instrument a ratchet is used for the handle to drop into for the purpose of stopping opposite each letter.

Fig. 6 is a letter-showing magnetic telegraph. It is worked by a lever or pedal. Reverse currents are produced by its motions, all the downward movements inducing them in one direction, and the opposite by allowing the lever to recover its position. It has to be depressed thirteen times

to produce one revolution of the hand round the receiving dial. This instrument is somewhat slow in its action from this circumstance; but it is in use in several places, and gives satisfaction owing to its non-liability to get wrong.

The operator, keeping his eye on his own dial, knows that any letter he causes the hand to pause at will be in like manner indicated on the distant instrument. All the letters and figures on the dial marked with a dash are those at which the hand stops when the lever is pressed down. Those without dashes by its upward movement.

Fig. 7 represents a relay, or instrument by which a small amount of power is made to bring into action a greater quantity from another source. It consists of an electro-magnet with semicircular pieces fixed to the poles, within which a soft iron needle or cross-piece (rendered magnetic by a voltaic or magneto-electric, is made to pass through the coils. A piece of gold fixed to the moving magnetic needle making contact with another piece in an adjusting screw, and completing the circuit battery either for printing or for transmission to another station. This instrument is used either with or without reverse currents; a permanent magnet, seen at one end of the sketch, is used for adjusting instead of a spring.

A time-keeper, usually termed a regulator, is shown in fig. 8; it has apparatus for transmitting alternate reverse currents of electricity for actuating the companion shown in fig. 9, or for other purposes. The currents are sent every second, and pass through the coils shown at the back of fig. 9.

This might be many miles distant from the regulator. It has a spring with fusee and chain; once winding keeps it going for six months. The train, with the escapement, remains stationary until the current passes throughout the coils, when the deflection of the magnetic needle causes the escape wheel to move half a tooth, the seconds-hand on the dial moving one second division. The next current, being in the reverse direction, deflects the needle the opposite way, and causes the escape wheel to move another half tooth, and thus the two time-keepers work accurately together. A clock with a very large dial may be used in this way, as the power of the spring does all the work of moving the hands, the current only being required just to liberate the escapement at the proper time.

Fig. 10 shows a very delicate galvanometer, fitted up as a differential one, the needle axis pivoted in jewels with levels, adjustments, &c.

Fig. 11, a ditto not differential, with needle suspended by silk fibre; either of these will be affected by an extremely feeble current.

[2910]
HETT, A., 4 *Albion Grove, Islington*.—Injected microscopic preparations.

[2911]
HICKS, JAMES, 8 *Hatton Garden*.—Meteorological instruments.

[2912]
HIGHLEY, SAMUEL, F.G.S., F.C.S., &c., Philosophical Instrument Maker, 70 *Dean Street, Soho, London, W.*—Educational microscope and philosophical instruments.



£1 5s.

£5 5s.

£2 12s. 6d.

£13 13s.

£3 3s.

£7 10s. 6d.

12s. 6d.

MICROSCOPES.—Naturalists' pocket-lenses, on telescope stand, and universal motion support, for the examination of minerals, &c. Improved Quekett's pocket dissecting microscope. Dr. Lionel Beale's pocket clinical microscope, lecturers' demonstrating microscope, and lamps.

Highley's "Educational Microscope," "Hospital students' microscope," and large microscope with complete mechanical motions.

A series of cheap achromatic object-glasses, comprising 3-inch, 2-inch, 1-inch, $\frac{1}{2}$ -inch, $\frac{1}{4}$ -inch objectives.

Accessory apparatus and appliances for the microscope.

An improved bi-prism spectroscope, and accessory apparatus for observations on gases, vapours, Gladstone's "absorption spectra," and stellar phenomena.

Universal polariscope, for table or lecture-room demonstrations on polarized light.

Universal electro-magnet, in glazed lantern, for magnetic, diamagnetic experiments, &c.

Bohnenberger's electroscope; astatic galvanometer; Melloni's apparatus for illustrating the athermic and diathermic character of minerals, and the refraction and polarization of heat. An educational astronomical telescope, &c.

[2913]
HINTON, W., 21 *Greville Street*.—Improved barometers.

[2915]
HOOPER, WILLIAM, 7 *Pall Mall East, S.W.*—Submarine telegraph cables insulated with india-rubber.

[2916]
HORNE & THORNTWHAITE, 121, 122, & 123 *Newgate Street*.—Rhumkorff's induction coil; spectrum apparatus; meteorological instruments; chemical apparatus; microscopes, &c.

[2917]
HUDSON & SONS, *Greenwich*.—Animal, vegetable, and fossil tissues and structures, and minerals for microscopic use.

[2918]
HUGHES, JOSEPH, *Queen Street, Ratcliff, London, E.*—Nautical, optical, and surveying instruments.

[2919]
JACKSON & TOWNSON, 89 *Bishopsgate Within, London*.—Chemical and scientific apparatus for general and special purposes.

REVENUE STANDARD STILL, by authority of the Board of Customs, for the alcohol test of wines; and by the Board of Inland Revenue for the analysis of beer.

WORKING LABORATORY for qualitative and quantitative analysis; bottles with enamelled labels.

PORTABLE CASE of BLOWPIPE and APPARATUS. APPARATUS for VOLUMETRIC ANALYSIS, arsenic determinations, benzole estimations, and chemical research generally.

CONDENSERS for DISTILLATION, various kinds of drying-baths.

FURNACES for ASSAYING, organic analysis, and general purposes.

NEW SPECIFIC GRAVITY BOTTLE, for weighing alcohols or ethers, at any increment of temperature, without removing the liquid.

[2920]

JOHNSON, HENRY, Inventor, 39 *Crutched Friars*.—Volutors for tracing spiral curves; deep-sea pressure-gauges, for recording the pressure or density of sea-water at various depths; deep-sea thermometers.

Invented by HENRY JOHNSON, 39 *Crutched Friars*; manufactured by F. HOFFMANN, 32 *Wilmington Square, Clerkenwell*.

THE VOLUTOR.

Papers on this instrument were read by the Rev. Dr. Booth, F.R.S., before the Mechanical Section of the British Association, at the meeting held at Leeds in 1858, and the meeting held in Oxford in 1860.

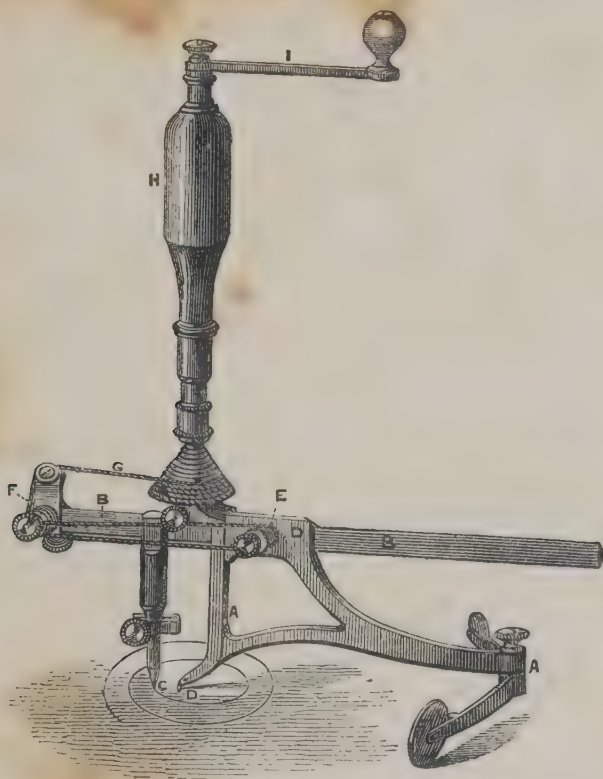
This instrument has been contrived for the purpose of facilitating, by means of mechanical arrangements, the drawing of volutes, an operation that requires much time and care, and also the drawing of other spiral curves.

During the action of the instrument a band is wound

round its centre, which regulates the pencil, and thus a continuous curve is traced with a radius varying in length at every point.

The radius of the curve is increased during each revolution by the circumference of the axis, and a circular cylinder will be found convenient as an axis for tracing spirals whose radii increase in arithmetical or other proportions.

In drawing volutes a flat band may be used, wound round a cylinder, so that each coil encloses the preceding one, and increases the diameter of the axis; but a grooved cone appears to be more convenient, as the proportions of a cone and the distances between the grooves may be more readily adapted to the curves required.



A stand with wheels, A, moved round the central point O, supports a horizontal arm or bar B, and which moves through a horizontal tube, D, on the stand. To the horizontal arm is fixed the tracing pencil C, pressed down by a vertical spiral spring.

A steel rod rises through a perforated grooved cone (or other axis) and its handle H, and is furnished with a small winch handle I, by which the stand is made to revolve, while the cone is held still by its handle H; and a band G, one end of which is attached to the cone and the other to one end of the horizontal arm, is wound round the cone, and the end of the arm is gradually drawn towards the centre, and the curve is traced by the pencil.

In volutes commenced at the extremity of the radius vector the band is attached to the base, and adjusted to the groove selected for the first curve, and is wound round the cone approaching the apex as the instrument revolves.

When tracing volutes commencing at the centre and receding from it, a movable set of pulleys F should be fixed with a screw on to the outer end of the horizontal arm.

One end of the band being fastened to the pulleys, and the other attached to the apex of the cone, it will be wound round the cone approaching the base, and the pencil will recede from its position in the centre, tracing the curve as the outer end of the arm is drawn by the band towards the centre.

When variations of radius less than the circumference of the axis at each revolution are required, the effect of the band wound round the centre may be modified

by passing it over some of the pulleys, one set of which, E, is fixed on the stand, and the other set, F, is movable, and may be screwed on to either end of the arm. The effect varies according to the number of lines of band over which it is distributed; as, for instance, when the band is passed over one pulley the effect is distributed over two lines, and the radius varies in a revolution one-half of the circumference of the axis; when the band is passed over two pulleys the effect is distributed over three lines, and the radius varies in a revolution one-third of the circumference of the axis, &c.

When tracing the fillet of a volute the cone should be turned round until the band is tightened, after the pencil has been placed in its proper position.

The size of the axis is thus slightly altered, and a proportionate distance maintained between the curves.

In drawing a parallel curve, as the size of the centres must coincide, it will be necessary to alter the length of the band to suit the position of the pencil.

THE DEEP-SEA PRESSURE-GAUGE.

A paper on this instrument was read by James Glaisher, Esq., F.R.S., before the Mathematical and Physical Science Section of the British Association, at the meeting held at Manchester in 1861.

In deep-sea soundings the pressure of water is too great to admit of accurate measurement by the compression of any highly elastic fluid confined in a small portable instrument.

For a long period water was considered incompressible, but it has been found to possess a slight degree of elasticity, sufficient to render its compression in a vessel avail-

JOHNSON, HENRY—*continued.*

able as an indication of the compression or density of the water into which it is lowered.

In the year 1762, December the 16th, Mr. Canton communicated to the Royal Society the results of his experiments on the compressibility of water—*Philosophical Transactions*, vol. lii., page 640.

He took a small glass tube of about two feet in length, with a ball at one end of it of an inch and a quarter in diameter, and filled the ball and part of the tube with water exhausted of air, and left the tube open that the ball, whether in rarefied or condensed air, might always be equally pressed within and without. He placed the ball and tube under the receiver of an air-pump, and could see the degree of expansion of the water answering to any degree of the rarefaction of the air; and also placed the ball and tube into the glass receiver of a condensing engine, in which he could see the degree of compression answering to any degree of condensation of the air.

In this way he found by repeated trials, when the temperature was about 50° Fahrenheit, and the barometer about a mean height, that the water expanded and rose in the tube, by removing the weight of the atmosphere, one part in 21,740, and that it was as much compressed under the weight of an additional atmosphere.

More recently, Mr. Perkins found, when subjecting water to great pressure, a diminution in volume of $\frac{6}{100}$ th parts under a pressure of 1120 atmospheres, equal to one part in 18,666 per atmosphere.

The experiments of Mr. Perkins, exhibited at the Adelaide Gallery, appeared to be intended as a demonstration of the fact of progressive compression, rather than a basis for minute calculation.

The effect of pressure of water at great depths is illustrated by a very interesting experiment made by Rear-Admiral Sir James Clarke Ross, who, after lowering several bottles which returned to the surface with the corks reversed, lowered a bottle fitted with a tube; a cork being suspended in the bottle so as to enter the tube in the event of the water in the bottle, being condensed under heavy pressure, and expanding upon the raising of the bottle and the diminution of the pressure.

Upon the return of the bottle to the surface, it was found that the cork had been forced some distance along the tube, and the compression of the water in the bottle, and its subsequent expansion, were thus demonstrated.

In experiments conducted with a pressure-gauge made of metal, it was found that air-bubbles adhered to the inner surface of the pressure-gauge, and materially affected the results.

This difficulty is avoided in the instrument now exhibited, which is composed of glass, so that the absence of air-bubbles may be ascertained by inspection before any experiment is made.

The instrument consists of a cylindrical glass vessel with a long neck or stem finely graduated; within which are placed a flat elastic ring to act as an index, and an elastic stopper.

When used, the pressure-gauge should be well rinsed with warm water, to prevent the adhesion of air to its inner surface, and then filled to the top of the stem with sea-water boiled to free it from air.

In the event of this water being poured in while warm, it will be necessary to fill up the stem after the water has cooled down to the temperature of the atmosphere, so that the stopper may be inserted without confining any air beneath it. A small vent, or grooved needle, affording a passage for the escape of superfluous water, should be pushed in with the stopper, which should be slightly lubricated to prevent excessive friction, until the lower end of the stopper is coincident with the zero, or top line of the graduated scale, marked 2000, when it will also touch the flat elastic ring.

The vent should then be withdrawn and the stem will remain tightly closed by the stopper.

When lowered into water of greater density, the water in the pressure-gauge is compressed by external pressure until of equal density with the surrounding water, and

the elastic stopper and the elastic ring are pressed along the tube towards the cylinder.

When raised, as the external pressure diminishes, the water in the pressure-gauge expands, and gradually presses back the elastic stopper, the elastic ring remaining as an index to mark the extreme compression.

When the water attains the temperature of the atmosphere the stopper will have returned to its original position, less a small difference arising from friction.

The volume of water in the cylinder and stem is considered as consisting of 2000 parts, of which the cylinder contains nine-tenths, or 1800 parts or degrees, and the stem one-tenth, or 200 degrees, and which are numbered 1801 to 2000.

The graduated scale on the stem may easily be read to one-tenth of a degree, or $\frac{1}{20000}$ th part of the whole volume of water.

For the compression of one part in 20,000 of boiled sea-water a pressure is required of 15·8 lbs. avoirdupois per square inch, equal to the pressure of a depth of 35·446 feet, or nearly six fathoms.

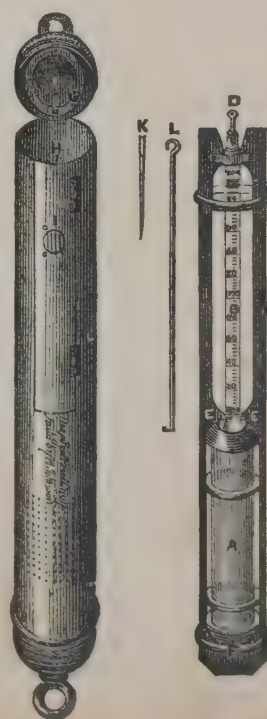
This amount of pressure, which is the result of several experiments, and which is confirmed by the observations of Mr. Canton, appears to be a fair basis for the compilation of tables of comparison of depth and pressure.

The instruments should, however, be attached to sounding lines, and the indications compared with the depths shown by the lead. The results would form a table of comparison of depth and pressure of practical use in determining depths when strong currents render the use of the lead uncertain.

A correction will be required for the variation in volume of water with change of temperature, and which is not uniform, being greater at high temperatures, as, for instance—

At 86° the volume is for this object	
estimated at	20,000 parts.
At 65° the volume is contracted to ..	19,932·5 "
The difference for 21° being ..	67·5 parts,
or for one degree 3·21 parts.	
The volume at 65° of ..	19,932·5 parts,
is contracted at 31° to ..	19,880 "
The difference being for 34° ..	52·5 parts,
or for one degree 1·55 parts.	

A series of experiments will be made to determine the correction required on account of friction.



References—

- A. Cylinder.
- B. Stem with graduated scale.
- C. Flat elastic ring or index.
- D. Elastic stopper.
- E. Metal frame lined with caoutchouc.
- F. Caoutchouc rings preventing concussion.
- G. Caoutchouc rings at top and bottom of the case, securing the frame in position.
- H. Metal hook on door fastening down the top of case.
- I. Clasp to door, let in to avoid projection.
- K. Vent or grooved needle inserted with stopper.
- L. Hook used to draw up the elastic ring.

The following table shows the volume of water for each degree of temperature, from 31° to 86° Fahrenheit.

JOHNSON, HENRY—continued.

Variation in the volume of Sea Water, boiled to free it from air, with change of temperature. Thermometer 67·5° Fahr. Barometer 29·92.

Deg.	No. of Parts.	Deg.	No. of Parts.	Deg.	No. of Parts.
Fahr.		Fahr.		Fahr.	
86°	20000·0*	64°	19930·0	42	19888·0
85	19996·0	63	19927·5	41	19886·7
84	19992·5	62	19925·0	40	19885·5
83	19989·6	61	19922·5	39	19884·5
82	19985·5	60	19920·0	38	19883·5
81	19982·0	59	19917·5	37	19883·0
80	19978·5	58	19915·0	36	19882·5
79	19975·0	57	19913·0	35	19882·0
78	19971·5	56	19911·0	34	19881·5
77	19968·0	55	19909·0	33	19881·0
76	19964·7	54	19907·0	32	19880·5
75	19961·5	53	19905·0	31	19880·0
74	19958·25	52	19903·0	30	19880·0
73	19955·0	51	19901·0	29	19880·0
72	19951·5	50	19899·0	28†	19880·0
71	19948·0	49	19897·0	27	19880·0
70	19945·0	48	19895·0	26	19880·0
69	19942·5	47	19894·0	25	19880·0
68	19940·0	46	19892·5	24	19880·0
67	19937·5	45	19891·0	23	19880·0
66	19935·0	44	19890·0	22	19880·0
65	19932·5	43	19889·0		

* The volume at 86° being considered as unity, and divided into 20,000 parts.
† A gentle motion kept up to equalize the temperature of the sea water has prevented its freezing at 28·5°.

THE DEEP-SEA THERMOMETER.

A paper on this instrument was read by James Glaisher, Esq., F.R.S., before the Mathematical and Physical Science Section of the British Association, at the meeting held at Manchester in 1861.

This instrument is intended to be used simultaneously with the Deep-sea Pressure-Gauge, for the purpose of determining how much of the variation in volume of water, indicated by the latter instrument, is due to variation of temperature, and may be considered as an indispensable adjunct to it.

During the year 1844 some experiments were made by James Glaisher, Esq., F.R.S., on the temperature of the water of the Thames near Greenwich, at the different seasons of the year; when that gentleman found that the indications of temperature were greatly affected by the pressure on the bulbs of the thermometers. At a depth of 25 feet this pressure would be nearly equal to the pressure of three-fourths of an atmosphere.

These observations demonstrate the importance of using in deep-sea soundings an instrument free from liability of disturbance from compression by the surrounding water, and have ultimately led to the construction of the thermometer now exhibited.

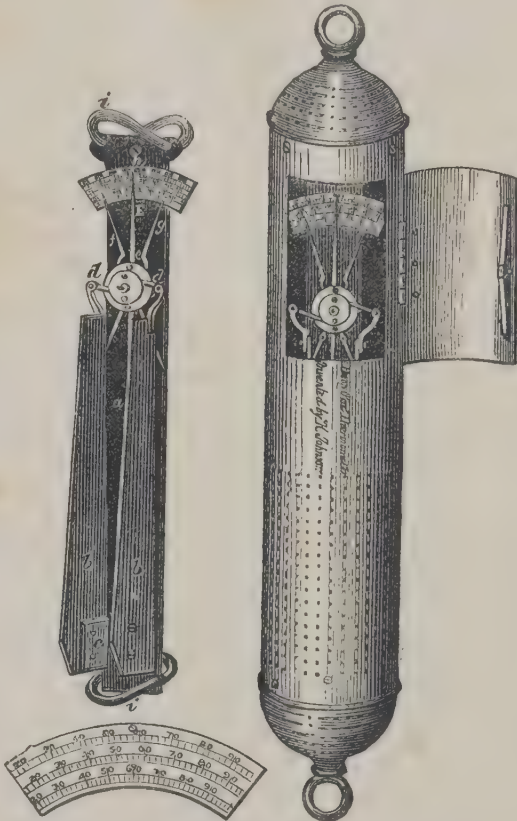
The instrument is composed of solid metals of considerable specific gravity, viz., of brass and steel, the specific gravity of these metals being 8·39 and 7·81 respectively. They are therefore not liable to compression by the water, which under a pressure of 1120 atmospheres, or at a depth of 5000 fathoms in round numbers, acquires a density or specific gravity of 1·06.

In the construction of this instrument, advantage has been taken of the well-known difference in the ratios of expansion and contraction by heat and cold of brass and steel, to form compound bars of thin bars of these metals riveted together, and which will be found to assume a slight curve in one direction when heat has expanded the brass more than the steel, and a slight one in the contrary direction when cold has contracted the brass more than the steel.

The indications of the instrument record the motions under changes of temperature of such compound bars;

in which the proportion of brass, the more dilatable metal, is two-thirds, and of steel one-third.

Upon one end of a narrow plate of metal about a foot long, *a*, are fixed three scales of temperature, *h*, which ascend from 25° to 100° Fahrenheit, and which are shown more clearly in the drawing detached from the instrument.



Upon one of these scales the present temperature is shown by the pointer *e*, which turns upon a pivot in its centre. The register index *g* to the maximum temperature, and the index *f* to the minimum temperature, are moved along the other scales by the pin upon the moving pointer at *e*, where they are retained by stiff friction.

At equal distances from the centre of the pointer are two connecting pieces, *d d*, by which it is attached to the free ends of two compound bars, *b b*, and its movements correspond with the movements of the compound bars under variations of temperature.

The other ends of the bars are fastened by the plate *c* to the plate *a*, on which the scales of temperature are fixed. The connection of the bars with both sides of the centre of the pointer prevents disturbance of indication by lateral concussion.

The case of the instrument has been improved at the suggestion of Rear-Admiral Fitzroy, and now presents to the water a smooth cylindrical surface, with rounded ends and without projection of fastenings.

In surveying expeditions this instrument would be found useful in giving notice of variation of depth of water, and of the necessity for taking soundings.

A diminution of the temperature of water has been observed by scientific voyagers to accompany diminution of depth, as on nearing land or approaching hidden rocks or shoals. Attention would also thus be attracted to the vicinity of icebergs.

In the same case is exhibited a small instrument of an ornamental character, named the Metallic Thermometer, which illustrates the principle of the Deep-sea Thermometer; a compound bar, the lateral motion of which regulates the indications of temperature, being open to inspection.

One of the Deep-sea Thermometers was suspended by Mr. Glaisher on a thermometer-stand for six months, and read daily in connection with standard meteorological instruments. During this period the readings approximated to those of the best instruments.

[2921]

JOHNSON, W., Manufacturer, 188 *Tottenham Court Road*.—Spectacles cut from solid steel; invisible spectacles; process of manufacture.

[2922]

KIESSLER & NEU, 29 & 49 *Spencer Street, Goswell Road*.—Analytical balances, &c.

[2923]

KNIGHT, GEORGE, & SONS, 2 *Foster Lane, London, E.C.*—Chemical, electrical, galvanic, and other philosophical apparatus.

[2924]

KULLBERG, V., 12 *Cloudesley Terrace, London, N.*—Self-registering mariner's compass, or course indicator.

[2925]

LADD, WILLIAM, 11 & 12 *Beak Street, Regent Street, W.*—Focimeter for lighthouses; induction coils, and apparatus connected therewith; compound microscopes of improved construction; ditto with magnetic stage; a triple-barreled air-pump.

[2926]

LADD & OERTLING, 192 *Bishopsgate Street Without*.—Bullion, chemical, and assay balances; metal hydrometers and saccharometers. (*See page 21.*)

[*Obtained the Council Medal in Class X. of the Great Exhibition of 1851, and the First Class Medal of the Paris Exhibition of 1855.*]

The BULLION, CHEMICAL, and ASSAY BALANCES represented in the opposite page are constructed upon the system of three edges working against three planes. Not only does the fulcrum rest upon a plane, but the pans also are suspended by inverted planes, upon knife-edges, affixed to the ends of the beams. The advantages obtained by this system are twofold: first, it admits of the balance being adjusted to the greatest point of sensibility without diminishing its precision and constancy; and, secondly, when the balance is

not in actual use, the pans are resting upon supports entirely independent of the beam. The bullion balances are made of sizes varying in length from 24 to 60 inches. In the chemical and assay balances the knife-edges as well as the planes are of agate, in order to protect the most important parts of the instrument against the fumes of the laboratory and the effects of damp climates.

Ladd and Oertling are manufacturers of balances to her Majesty's Exchequer, the Bank of England, the Assay-offices of the Royal Mint, &c.

[2927]

LAING, JAMES, 2 *McVicar's Lane, Perth Road, Dundee*.—Motoroscope: a new optical instrument giving motion besides relief to the individual objects of the stereoscope.

The object of this instrument is to give *motion* to stereoscopic figures, besides relief; that is, to give motion to the individual figures in a stereoscopic view; such as to show a carpenter in the act of sawing, or a machine in

action. The relief and the motion combined, certainly presents to the eye one of the most extraordinary optical delusions that has yet been produced by only apparent phenomena.

[2928]

LANKESTER, DR. EDWIN, 8 *Saville Row*.—An ozonometer for registering the hourly variations of ozone.

[2929]

LEWIS, JOSEPH, *Dublin*.—Lewis's patent automaton register and pentagraph, applied to photo-printing and printing surfaces.

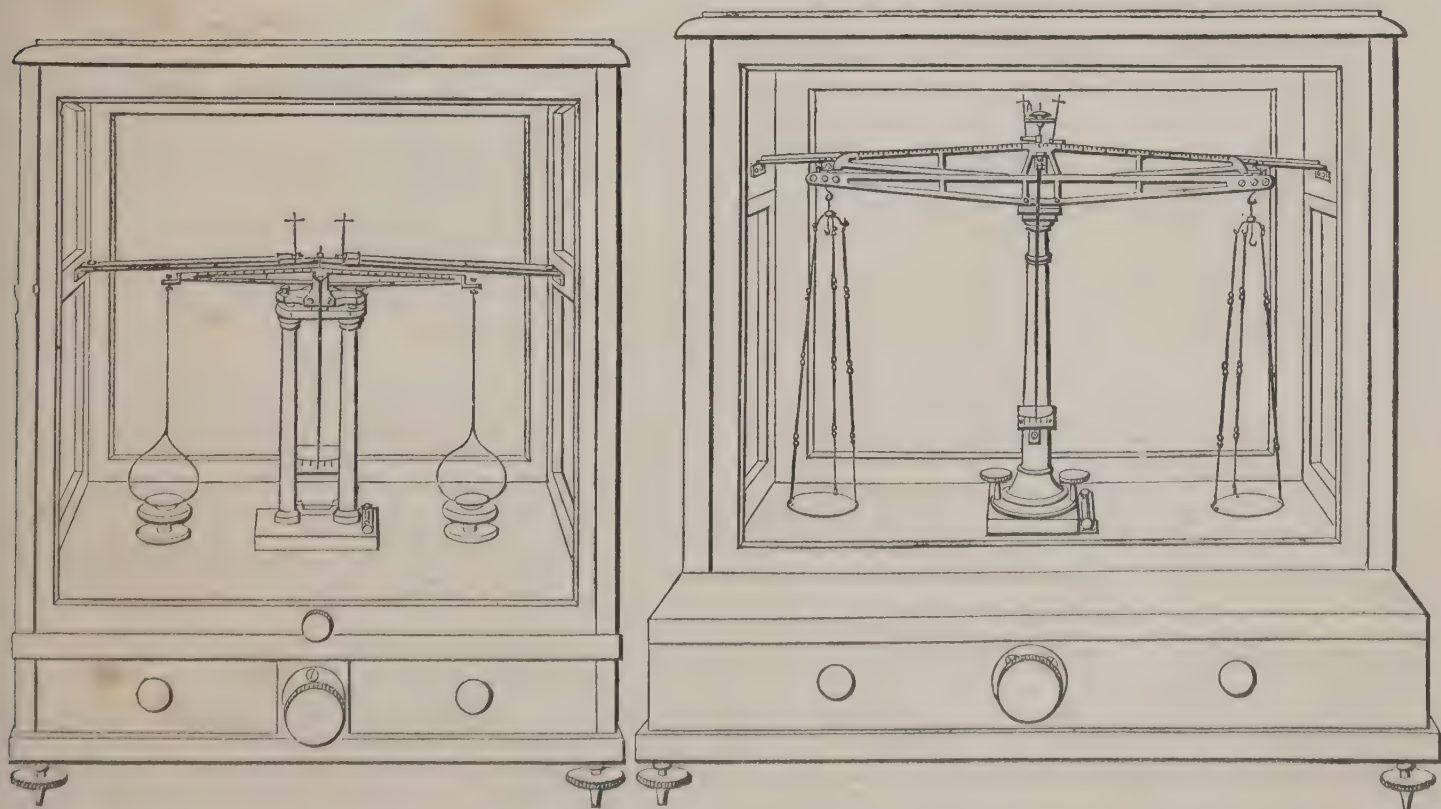
[2930]

LOWE, RIGHT HONOURABLE R., 34 *Lowndes Square*.—Spectacles which magnify without glass or any other refracting medium.

[2931]

MACDONALD, DR., 4 *Coburg Place, Kennington Lane*.—Instrument to facilitate finding the longitude at sea.

LADD & OERTLING, 192 *Bishopsgate Street Without.*—Bullion balances, &c.



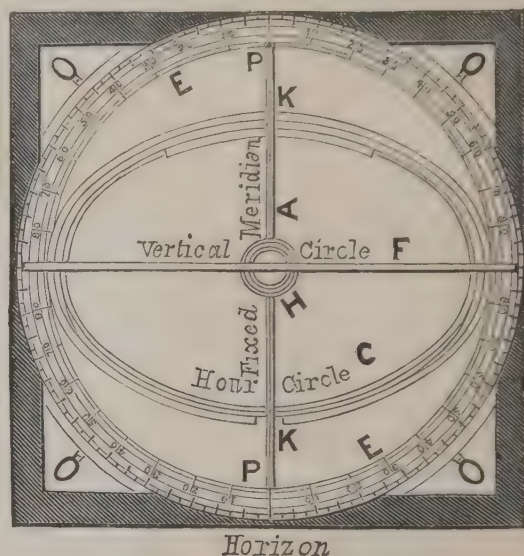
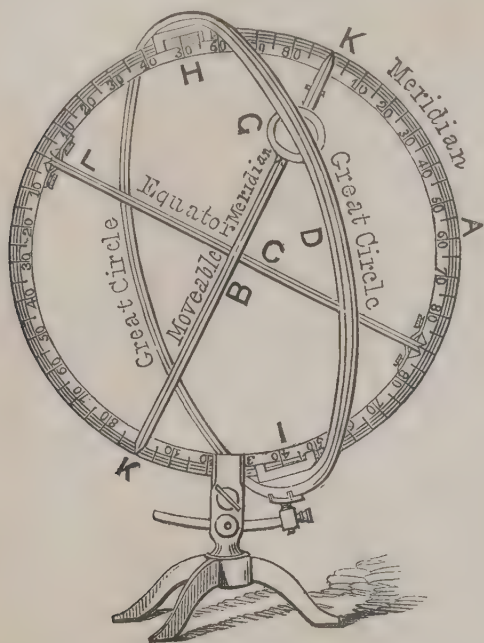
BULLION, CHEMICAL, AND ASSAY BALANCES.

[2934]

MINCHIN, HUMPHRY, M.B., 56 *Lower Dominick Street, Dublin*.—Galactoscope—for measuring the transparency of milk.

[2935]

MOORE, CHARLES, *Quay Parade, Swansea*.—Indicator for ascertaining nautical and astronomical problems, and magnetic variation of compasses.



The purposes of this instrument is to ascertain and indicate approximate solutions of the various nautical and astronomical problems occurring in navigation, with sufficient accuracy for nautical purposes. Much accuracy depends upon the deviation of the compasses by local at-

traction. This is immediately discoverable by this instrument at sea, on board all descriptions of vessels, in all positions, and in all climates.

Prices from 20*l.* to 25*l.*

[2936]

MORTIMER, JOHN, *Pippinford Park, Maresfield, Sussex*.—Instrument for the readier determination of the amount of inclination and declination of the magnetic needle.

A COMPASS for determining the amount of inclination and declination of the magnetic needle, and the true north.

Obtain the smallest amount of dip and the greatest amount (90); mark the number of degrees traversed on the small dial for this; half these will be the amount of the apparent variation, and at this point will be the true north.

Two such needles with opposite poles, poised horizontally and placed in a line will detect any amount of local attraction.

The small globular instrument, on being arranged to the latitude of the place, will show the true declination and the point of terrestrial attraction.

[2937]

MURRAY & HEATH, 43 *Piccadilly*.—Various apparatus for the teaching and illustration of science.

[2938]

MUSSELWHITE, JOHN, *Devizes*.—An improved syphon.

[2939]

NEGRETTI & ZAMBRA, 1 *Hatton Garden, E.C.*; 59 *Cornhill, E.C.*; and 122 *Regent Street* (late NEWMAN).—Meteorological and optical instruments. (See pages 23 to 25.)

[2940]

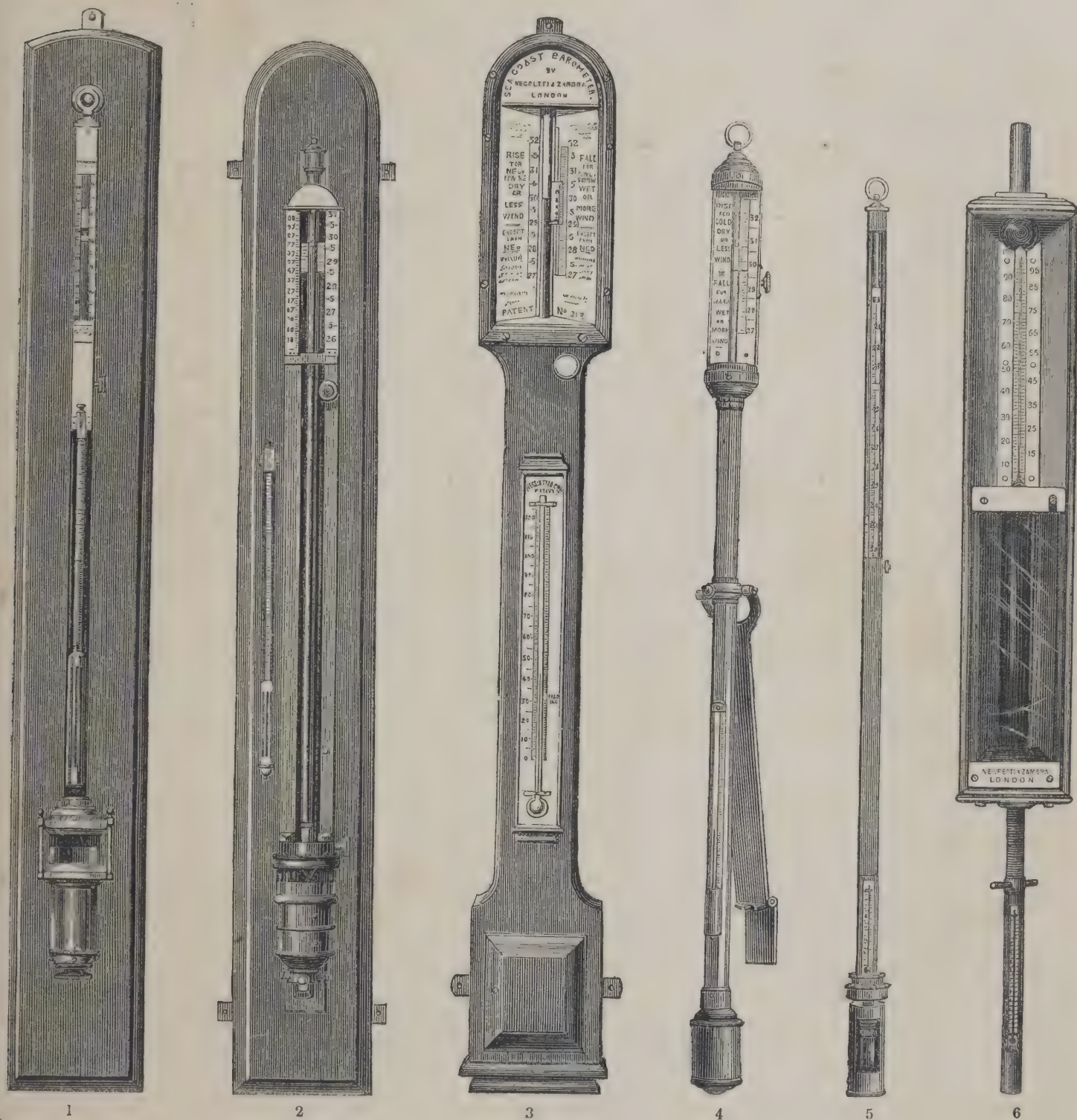
NEWTON & Co., 3 *Fleet Street, London*.—Mathematical and surveying instruments; philosophical apparatus; lanterns and dissolving views.

[2941]

NORMAN, JOHN, 178 *City Road*.—Microscopic objects, and materials for their preparation.

The exhibitor manufactures and prepares all kinds of microscopic objects, and supplies slips, cells, and all the requisites for mounting. Established 1846.

NEGRETTI & ZAMBRA, 1 *Hatton Garden, E.C.*; 59 *Cornhill, E.C.*; and 122 *Regent Street* (late *NEWMAN*).—Meteorological and optical instruments.



STANDARD METEOROLOGICAL INSTRUMENTS.

No. 1.—Standard barometer on Fortin's principle, reading from an ivory zero point in the cistern, to insure a constant level, with mercury boiled in the tube. The barometer tube is enclosed and protected by a casing of brass throughout its whole length; the upper portion of which has two longitudinal openings opposite each other; on one side of the front opening is the barometrical scale of English inches, divided to show, by means of a vernier, $\frac{1}{500}$ th of an inch; on the opposite side is sometimes a scale of French millimètres, reading also by a vernier to one-tenth of a millimètre.

No. 2.—Negretti and Zambra's modification of New- man's Standard Barometer, in which a greater amount of light is admitted to the reading surfaces of the instru- ment.

No. 3.—The Fishermen's and Life-Boat Station Baro- meter made by Negretti and Zambra, especially for the Board of Trade, Royal Life-Boat Institution, and

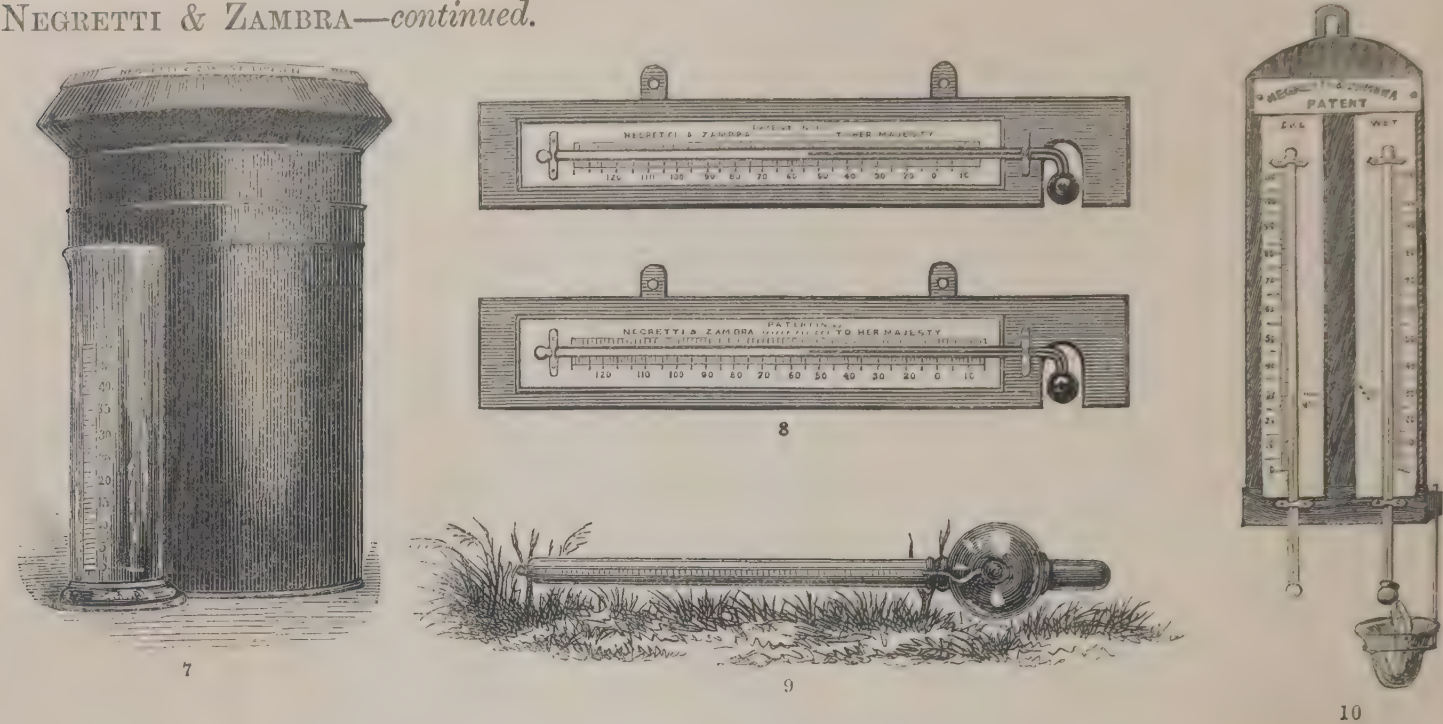
British Meteorological Society, to be fixed at all the principal seaports, fishing and life-boat stations on the British coast.

No. 4.—Board of Trade Standard Marine Barometer, as made by Negretti and Zambra for Her Majesty's Go- vernment, with spare tube to replace in case of accidents.

No. 5.—Negretti and Zambra's Patent Portable Moun- tain Barometer. To make an observation the instrument is suspended vertically, and the cistern unscrewed until the surface of the mercury is brought exactly level with the extreme end of the ivory zero point. The reading is then taken by the scale on the limb and vernier. To make the instrument portable, it is in- clined until mercury from the cistern fills the tube, the cistern must then be screwed up as far as it will go.

No. 6.—Actinometer (Sir John Herschel's) for as- certaining the absolute heating effect of the solar rays, in which *time* is considered one of the elements of obser- vation. See "Report of Royal Society on the Physics and Meteorology."

NEGRETTI & ZAMBRA—continued.



No. 7.—Glaisher's Rain Gauge. This gauge is arranged for the reception of the water only which falls upon its receiving surface, and for the prevention of loss by evaporation.

No. 8.—Negretti and Zambra's Patent Self-registering Maximum and Minimum Thermometers. The only instrument of the kind adapted for transmission to India and the Colonies. It is impossible to disarrange these instruments unless actually broken.

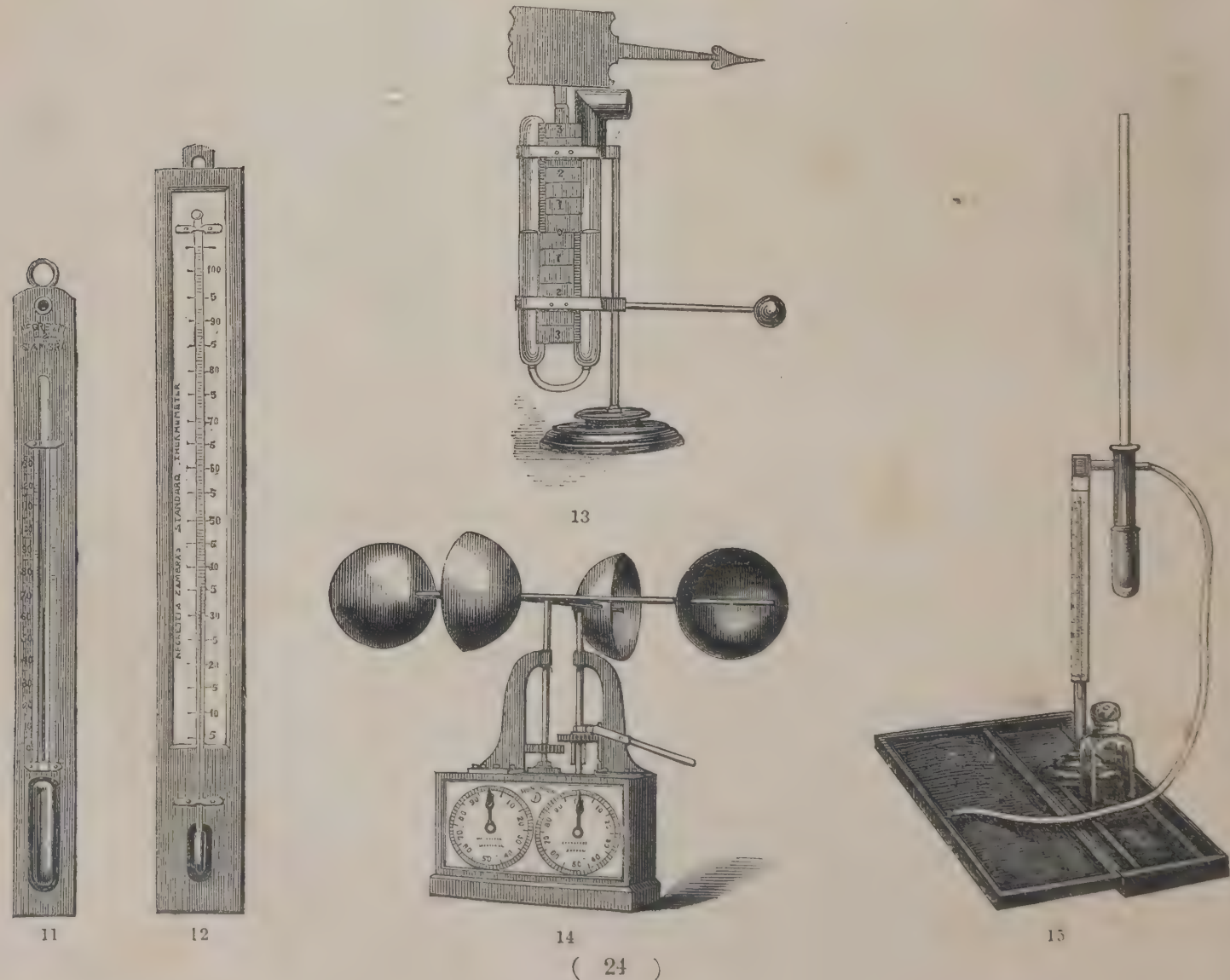
No. 9.—Negretti and Zambra's Patent Solar Radiation Registering Thermometer in Vacuum has a blackened bulb, the scale divided on its stem, a glass shield and globe surrounding the bulb and stem, from which all air

is exhausted. In use it should be placed horizontally, with its bulb in the full rays of the sun, resting on grass.

No. 10.—Dry and Wet Bulb Hygrometer or Psychrometre for determining the amount of moisture in the atmosphere, an instrument of great importance, equally useful in the sick chamber, hothouses, greenhouses, and conservatories. Glaisher's Tables for showing the quantity of moisture for a difference of every tenth of a degree furnished with each instrument.

No. 11.—Negretti and Zambra's Patent Mercurial Minimum Thermometer, for deep-sea observations, the only instrument that can safely be used.

No. 12.—Standard Thermometer divided on brass into



NEGRETTI & ZAMBRA—*continued.*

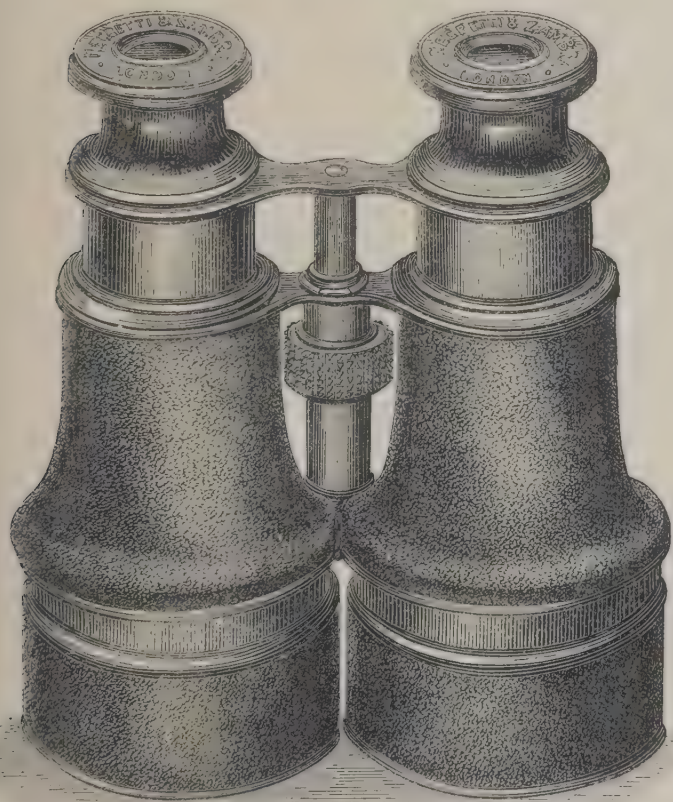
either Fahrenheit or Centigrade scale, or the divisions engraved on its stem. Negretti and Zambra's thermometers are made from selected tubes, the internal diameter of which is ascertained by very carefully conducted experiments. They are also strictly tested for index error, and a copy of the corrections furnished with each instrument.

No. 13.—Anemometer, or Wind Gauge, for showing the pressure of the Wind.

No. 14.—Anemometer for ascertaining the velocity of the wind. The readings on the dials of this Anemometer are in simple revolutions converted into actual miles.

Ostler's Self-registering Anemometer (improved by Negretti and Zambra), for showing the direction, force, and velocity of the wind; likewise the quantity of rain fallen in a given time, with clock-work and all necessary apparatus complete.

No. 15.—Regnault's Condenser Hygrometer as shown consists of a tube made of silver and glass very thin and perfectly polished; the tube is larger at one end than the other, the large part, silver, being 1·8 in depth by 8·1 in diameter; this is fitted tightly to a brass stand with a telescopic arrangement for adjustment. The more perfect form of this hygrometer has two sets of silver and glass tubes and thermometers.



NEGRETTI & ZAMBRA'S BINOCULARS WITH ROCK CRYSTAL LENSES.

The lenses of these instruments are constructed of the finest rock crystal, cut and worked so as to insure the highest perfection both in magnifying and defining power.

The superiority of crystal lenses over ordinary glass consists in the surfaces always remaining brilliant in all climates, not efflorescing or becoming dull and cloudy by exposure to the action of the atmosphere, and, from the extreme hardness of the crystal, not liable to be scratched. These instruments (the advantages of which will be appreciated by any who have had experience in the use of binocular glasses on foreign service) are offered by Negretti and Zambra at a price not much advanced on that of ordinary glasses.

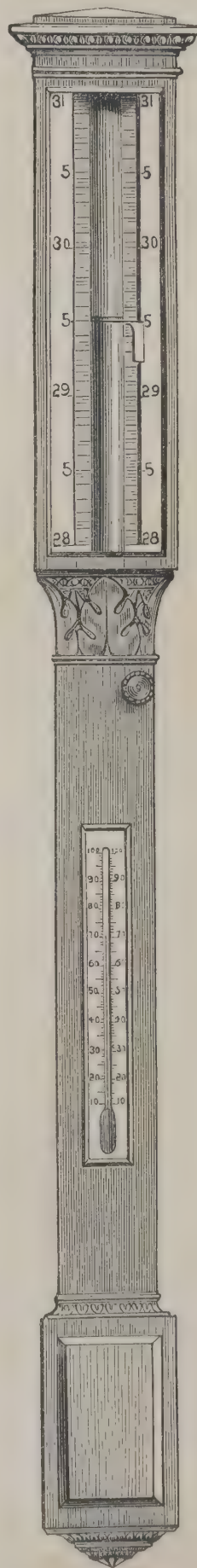
For further details of prices, &c., see Negretti and Zambra's descriptive catalogue of optical, mathematical, photographic, and standard meteorological instruments, &c., illustrated by upwards of five hundred engravings. Price (post free) 2s. 6d.

HOWSON'S PATENT LONG RANGE BAROMETER, MADE BY NEGRETTI AND ZAMBRA.

This fine instrument combines many excellences, and altogether supplies a desideratum of great importance to the progress of practical meteorology. Its action is based upon that of the Torricellian column, and is therefore of the most reliable character, but it derives its chief value from the introduction of a new principle by which a greatly extended range or length of scale is obtained.

The limits within which the ordinary barometric column oscillates are extremely narrow, and it was early felt that the public utility of the instrument would be greatly enhanced, if by any means the indications could be increased in length. This object was sought to be obtained by many devices, none of which may be said to have survived, except that of the wheel barometer, which, however, is an arrangement so inherently defective, that it has no good feature to recommend it.

The great value of the new construction consists in this, that no mechanism is employed for converting a short scale into a long one, but the mercury itself rises and falls through an extended range, naturally and in simple obedience to the varying pressure of the atmosphere. These instruments are usually made for domestic purposes with a scale from three to five, and for public use from five to eight times the scale of the ordinary standard. Their sensitiveness is consequently increased in an equal proportion, and they have the additional advantage of not being affected by variation of temperature, or from differences of level in the cistern. As regards the execution of the details and workmanship of these barometers, the makers have clearly felt that they had to deal with a valuable principle, and have endeavoured to do it full justice.



[2942]

ORCHARD, JOHN, Designer and Manufacturer, 2 *Phillimore Place, Kensington*.—Standard and compensating barometers; optical and other philosophical instruments.

A STANDARD BAROMETER in bronzed brass, constructed upon the most approved principles, so as to require as few corrections as possible, having the following additions and improvements. The cistern is made entirely of iron and glass, and is so arranged that it may be removed for cleaning without affecting the tube. The air-valve is so constructed as to open and close to the influence of the atmosphere. Two thermometers; one to take temperature of mercury in cistern, the other of that in tube.

STANDARD BAROMETERS, similar in form to the former, and constructed upon the same principles, but of less expensive workmanship; intended to meet the demand for a correct instrument at a price below that of the original standard.

COMPENSATING BAROMETERS, in bronzed brass cisterns of iron and glass, &c. The end designed in these instruments is to obtain as correct a reading as possible, without the trouble of a second adjustment, which is accomplished by displacing a quantity of mercury in the cistern equal to that taken up in the tube.

AN OXYHYDROGEN MICROSCOPE on new and improved principles, capable of illustrating to a large audience the revelations of the microscope in insect anatomy, &c., and intended to supply the want so much felt of some similar instrument to illustrate that science.

Various set of astronomical rack-slides, for illustrating the movements, &c., of the planets and other heavenly bodies.

[2943]

PARKES, JAMES, & SON, *St. Mary's Row, Birmingham*.—Microscopes; astronomical telescopes; mathematical, philosophical, and surveying instruments. (See page 27.)

[2944]

PASTORELLI, F., & Co., Opticians and Mathematical Instrument Makers, 208 *Piccadilly, and 4 Cross Street, Hatton Garden*.—Metford's theodolite; new level with micrometer for distances; standard meteorological and optical instruments. (See pages 28 to 30.)

[2945]

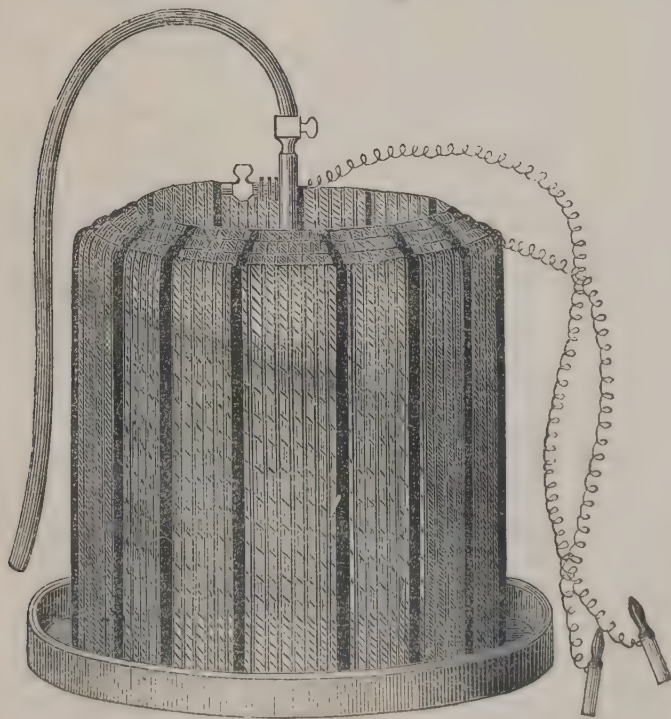
PILLISCHER, M., 88 *New Bond Street, W.*—Optical instruments of various kinds, principally microscopes. (See pages 31 to 33.)

[2946]

POWELL & LEALAND, 170 *Euston Road*.—Microscopes with rotating thin stage; binocular arrangement; object glasses from 2 in. to $\frac{1}{2}$ th, inclusive.

[2947]

PULVERMACHER, J. L., 73 *Oxford Street*.—Galvano-piline, a self-supplying constant battery.



PULVERMACHER'S PATENT GALVANO-PILINE, representing a most convenient self-supplying voltaic battery of constant action, excited by one exciting liquid, as vinegar, &c., is an extremely pliable and very durable fabric, composed of galvanic metal wires and a fibrous texture, made (according to the purpose required) in any width and length. According to the size and number of its elements, it produces galvanic currents of *intensity* or *quantity*

rendered constant in action by the porosity of its texture, the simultaneous contact of the atmospheric air, and the exciting liquid with the extensive surface of the galvanic metals. The Galvano-Piline is made simply flat or tubular. The first is set in action by a momentary immersion in the exciting liquid, the second by a steady self-supplying process by means of the hollow channel communicating with a small reservoir containing the exciting liquid. This simple voltaic flexible battery surpasses in power, portability, and constancy of action, all other single liquid batteries of equal size, and being always ready for use (by the simple arrangement for self-supplying the exciting liquid), its uniform generation of either continuous or intermittent currents renders it a valuable apparatus for medical cabinets, hospitals, electric baths (private or public), lectures, schools, telegraphic and other purposes. A list of apparatus for medical purposes, with prices, will be found in Class 17, page 129, of this Catalogue. These batteries can be seen in operation daily in the English Gallery, Class 13, No. 2947, and Class 17, No. 3570, and at the galvanic establishment of J. L. Pulvermacher & Co., 73 Oxford Street, London, adjoining Princess's Theatre.

PRICE LIST.

GALVANO-PILINE BATTERIES, for the instantaneous generation of constant volta-electric currents of intensity, charged with the liquid by a self-supplying arrangement.

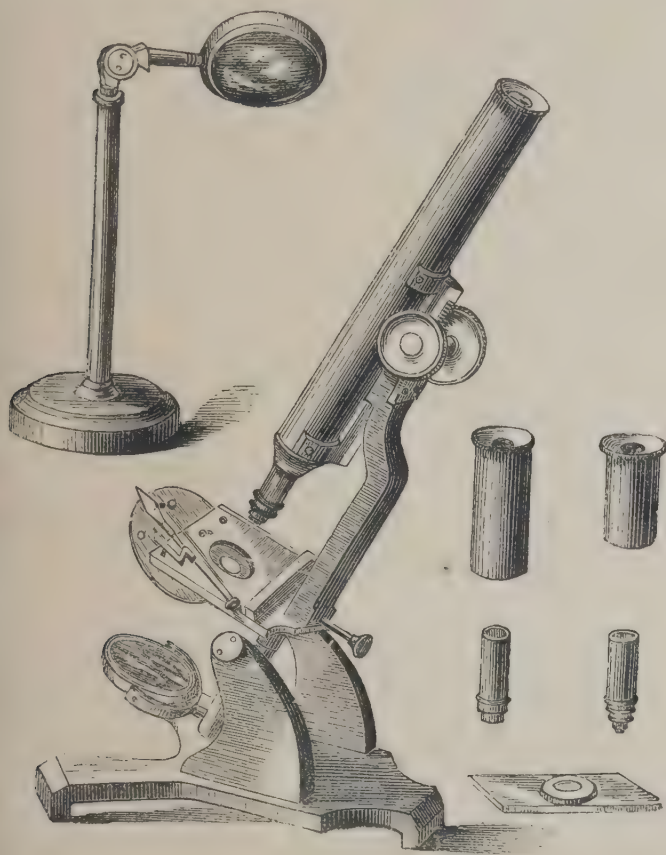
Galvano-piline battery, 50 elements, each $\frac{1}{2}$ s. d. element 2 square inches in surface, complete . 2 5 0

Ditto, ditto, 100 elements, each element 2 square inches in surface, complete . 3 15 0

Ditto, ditto, 100 elements, each element 5 square inches in surface, complete . 5 5 0

Ditto, ditto, 100 elements, 13 square inches in surface, complete . 9 15 0

PARKES, JAMES, & SON, *St. Mary's Row, Birmingham.*—Microscopes; astronomical telescopes; mathematical, philosophical, and surveying instruments.



The following are exhibited:—

MICROSCOPES.

SIMPLE MICROSCOPES, brass stands, from 2s. to 10s. 6d.

COMPOUND MICROSCOPES (not achromatic), 4s. 6d. to 27s.

IMPROVED COMPOUND SCHOOL MICROSCOPE, on steady tripod, with inclining joint, with achromatic combination forming two powers, in case, price 1l. 1s.

Ditto, size larger, with stand condenser, price 2l. 2s.

* STUDENTS' MODEL MICROSCOPE (as woodcut), with two eye-pieces; $1\frac{1}{2}$ inch and $\frac{1}{4}$ inch superior achromatic objectives; stand condenser, forceps, &c., complete in mahogany lock cabinet, price 3l. 3s.

* Ditto, ditto, with fine adjustment, and elongating body, 3l. 10s.

LARGER COMPOUND MICROSCOPES, with first-class objectives, at 5l. 5s., 7l. 10s., 10l. 10s., 15l., 20l., 30l., 40l., and 50l.

EXHIBITION FINE ART MICROSCOPE; the most magnificent instrument ever produced, 150l.

MICROSCOPIC PREPARATIONS (great variety) from 1s. to 18s. per dozen.

EDUCATIONAL SERIES of ditto, with descriptive lists, in sets at 5s., 10s., 15s., and 20s. per set.

POLARIZING APPARATUS, &c., may be fitted to any microscopes costing 3l. 3s. and upwards, at 25s. and 30s. each.

J. P. & S. wish to direct especial attention to their new Educational Microscope, at *five guineas*, which for quality, appearance, and price cannot be equalled. It is a full-sized instrument, with large stage, having a magnetic bar adjustment, which gives a very smooth and easy motion. It has an elongating body with coarse and fine adjustments; two eye-pieces; superior 2-inch, 1-inch, and $\frac{1}{4}$ -inch objectives; condenser; all packed in mahogany cabinet. It is so constructed that all necessary apparatus can be added at any time without the instrument being returned.

* Several hundreds of these instruments have already been supplied to the medical colleges, educational establishments, &c., at home and abroad; and have met with universal approval.



ASTRONOMICAL TELESCOPES.

EDUCATIONAL TELESCOPE on improved tripod stand (as woodcut), with 2 inch objective, a terrestrial and celestial eye-piece, with sun glass, in case, each 4l. 10s.

This instrument will show beautifully the lunar mountains, several planetary bodies, including Saturn's ring and one of his moons, also several double stars.

Larger ditto, ditto, with $2\frac{3}{8}$ inch objective, 7l.

* SUPERIOR FOUR FEET TELESCOPE, 3 inch objective, mounted on improved equipoise garden stand 5 feet 4 inches high, with vertical rack, 3 eye-pieces, &c., 15l. 10s.

* FIVE FEET ditto, $3\frac{3}{4}$ inch objective, on large stand 6 feet high, with 4 eye-pieces, 27l.

* FIVE FEET SIX INCH ditto, $4\frac{1}{4}$ inch objective, 40l.

Larger instruments to order.

POCKET and TOURISTS' TELESCOPES; OPERAS; MARINE GLASSES.

IMPROVED PATENT DRAWING INSTRUMENTS, in cases from 2s. to 5l. each. These instruments have received the approval and recommendation of the Council of the Society of Arts, and are used in many of the Government schools.

SURVEYING INSTRUMENTS, &c.

Theodolites, levels, transit instruments, prismatic, mining, and other compasses; land chains, tape measures, air-pumps, galvanic and electrical machines, &c., &c.

N.B. By the employment of machinery, J. P. & S. have been enabled to construct many of the above instruments in a superior style, with accuracy, and at a very reduced price. They have kept in view the *educational* character of microscopes, telescopes, and drawing instruments, and have especially endeavoured to make these *complete, substantial, and convenient* for use.

A discount allowed to wholesale dealers and educational establishments.

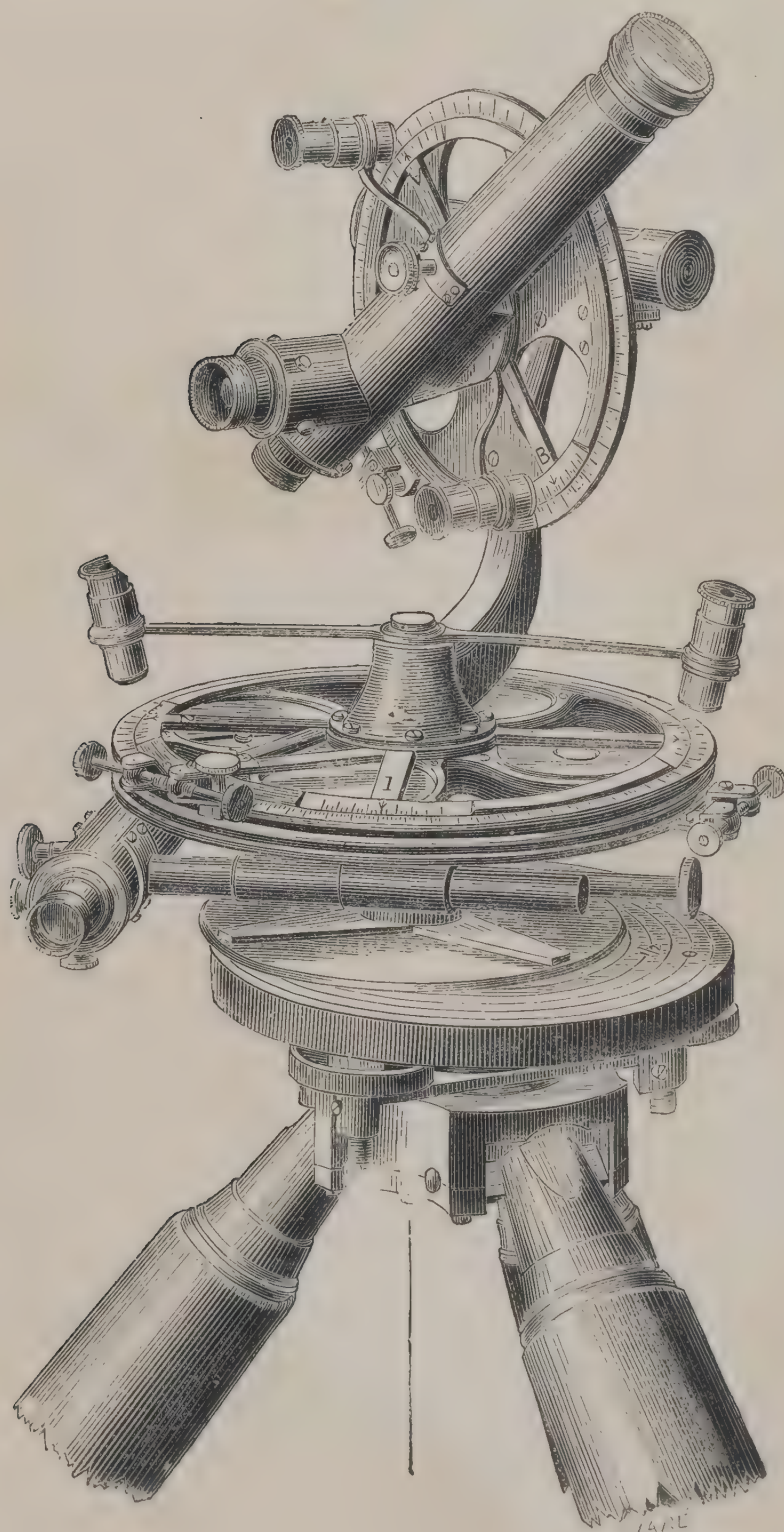
For more detailed information, see wholesale illustrated catalogue, post free for 1s.

* These mounted on improved equatorial stands at 5l. to 15l. extra.

PASTORELLI, F., & Co., Opticians and Mathematical Instrument Makers, 208 *Piccadilly*, and 4 *Cross Street, Hatton Garden*.—Metford's theodolite; new level with micrometer for distances; and standard meteorological and optical instruments.

METFORD'S TRAVERSING THEODOLITE.—This instrument is constructed with all the important improvements introduced by Mr. W. E. Metford, C.E., the results of actual practice in the field.

The levelling gear consists of three inverted screws, having good seats fitted closely to their beds, and effectually shielded from dust by caps. To prevent the screws becoming loose, the arms that enclose them are made with sufficient spring to admit of their being slightly tightened.



The traversing stage.—The object of this is to enable the observer to shift his instrument over the exact centre, after having set it up firmly, nearly level, and approximately over the point required. The main hollow centre of the instrument carries a circular foot, which is

able to travel in any direction to the extent of 1 inch from the centre, which is sufficient. The foot is properly secured by means of a three-arm pinching screw running on the hollow centre.

The check telescope, though not necessary in 5-inch instruments, or for ordinary work, is of great importance in larger ones. It lies between the traversing stage and the horizontal limb, where it can generally be used without taking advantage of its capability of sliding out; but by sliding it out a total horizontal and vertical range of 360° is obtained. The sliding horizontal and vertical motions are all fixed by one screw. Sliding the telescope out, was suggested by Mr. Newnham, C.E., of the Scinde Railway.

The horizontal limb, vernier circle, &c.—This limb is arranged to take the compass, a level with a circular bubble, and two memorandum slates on which constant errors, &c. may be recorded. The vernier plate is carried on four arms, and a diagonal brace (preventing the slightest twist in the arm) to which the tangent motion is attached. The horizontal limb has openings which enable the observer to take vertical angles to 70° in depression. Securely attached to the pivot is an arm to take the lower tangent apparatus. The brace system of tangents is adopted to prevent the loss of time occasioned by the wear of the common tangents. All the pivots have broad bearing flanges like those used in levels by Mr. Gravatt, and the pivots themselves and the bearing flanges are in one casting, thus conducing greatly to the rigidity of the whole instrument. The conical pivots fit in their sockets throughout their whole length, and not at the ends only.

The circular bubble was first used by Troughton, for the purpose of obtaining an artificial horizon, but was adapted to the theodolite by Mr. Metford. Its great advantage is, that it shows exactly the direction in which the level has been departed from, and it is thus a great aid in setting up the instrument before adjusting the traverser.

The means of supporting the upper works.—To the side of the main pivot is attached a strong curved bracket divided at the top into two arms. This bracket has a T section throughout and on the ends, and at the junction of the arms is fixed the vertical circle. The improvement is unquestionably an important one, since by it the suspension of the telescope over the axis is permitted. The use of the curved bracket is not attended by weakness, for the bracket is exceedingly stiff. It has been used by Mr. Metford for eight years with perfect success. The microscopes hang on the head of the casting, and travel far more conveniently than in the common instrument.

The telescope.—This is a "dumpy," care being taken to have all of its surface of object glass of good defining powers. The eye end passes clear over the axis, and therefore the instrument may be used as a transit. By this capability of turning over, it is of immense service in ranging railway curves, as regards accuracy in laying the tangent, and as regards time. It is also necessary in tunnelling, and in all altitude and azimuth observations, to which the instrument is perfectly adapted. A rectangular eye-piece is added to the telescope; it is taken out when the other eye-piece is used, and a stopper is inserted in its place; it is not however necessary to remove it entirely. The rays are turned with a prism, so that the loss of light is trifling.

The diaphragms.—Each diaphragm consists of two independent discs; and each takes one cobweb, and is so constructed that each web can be placed vertically or horizontally, as the case may be, and in the axis of the telescope also, independently of the other.

PASTORELLI, F., & Co.—continued.

Illuminating apparatus.—This consists of a small glass head placed about three quarters of an inch beyond the object glass, and just within its edge. A light thrown upon any point of its new hemisphere throws a mild faint light down the telescope.

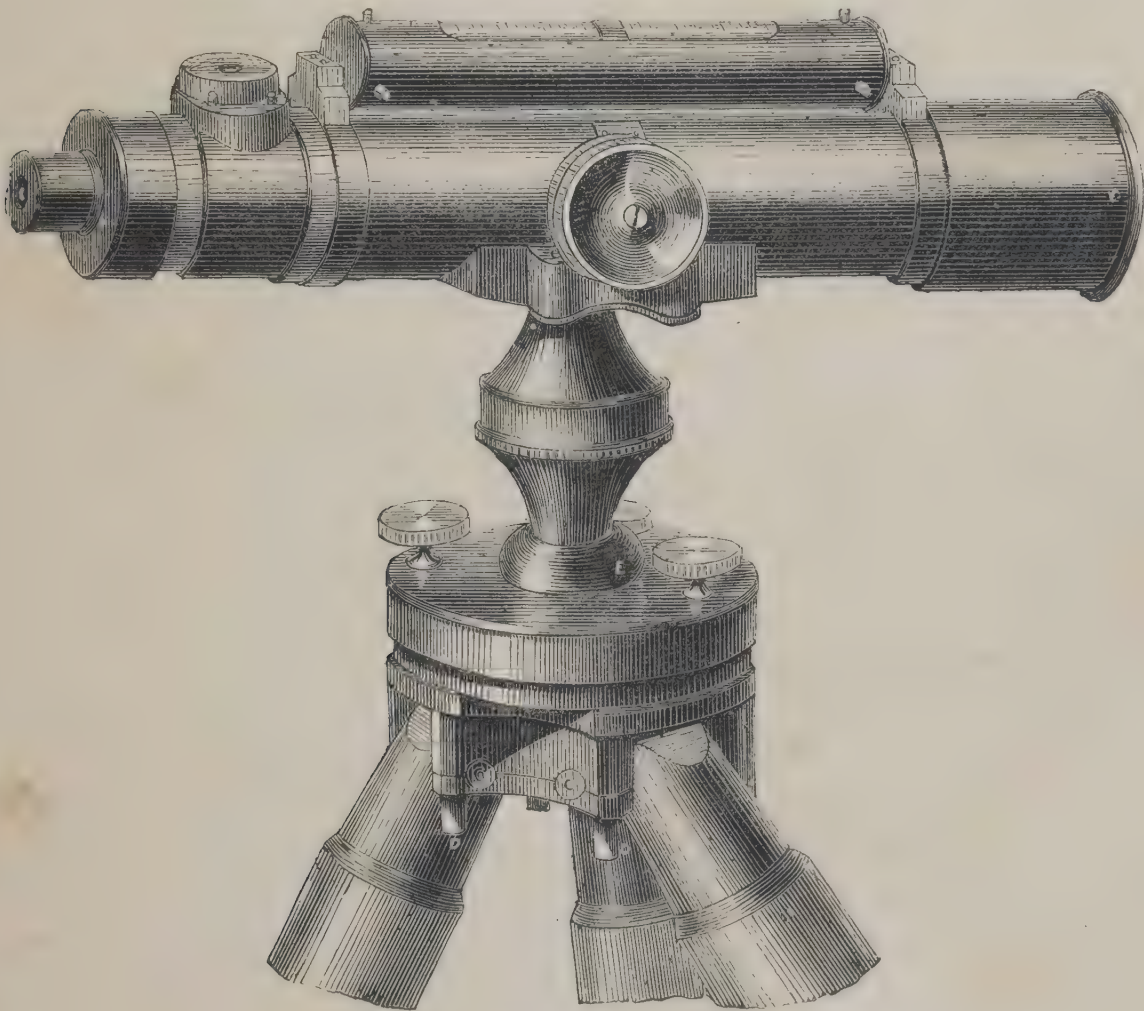
The object glasses.—These are placed in their cases backward, so as to allow the glass surface to project beyond the brass cell. By this means rain and dust can be wiped off in the shortest time, and with the least amount of scratching, without any of the difficulty attending the same process in the case of the common deep-seated glasses. The eye-piece block—that which stops the end of the telescope barrel—pulls out, and the cobwebs and diaphragms are thus exposed.

The staff-head is made according to Mr. Froude's arrangements, having the cheeks cast to a circular plate. The leg joints resemble an inverted mortar with strong trunnions, which can be tightened in their bisected cylindrical bearings, by means of capstan-headed screws.

General summary of advantages.—From the foregoing

detailed description of the construction of these instruments will be apparent their great superiority over those in ordinary use, especially as regards the great steadiness obtained by the adoption of the triple screw arrangement for levelling, in place of the ordinary parallel plates. There is also a great saving of time, when the instrument has to be set frequently in the course of the day; this is accomplished by means of the circular bubble and traversing stage, which allow of very speedy adjustment of the instrument. The various minor advantages will be best understood by the perusal of the foregoing description, which should be carefully compared by those requiring a theodolite, with the details of the ordinary maker. The great advantages of those here described will at once be apparent.

	£	s.
Seven-inch instrument, as above described, price	35	0
Five-inch ditto, but without check telescope or rectangular eye-piece	26	5



IMPROVED LEVEL.

F. PASTORELLI & Co.'s IMPROVED LEVEL.—This instrument combines several improved arrangements, giving increased facility in use, greater steadiness and freedom from vibration, more accurate adjustment, with scarcely a possibility of deranging them.

The tripod and its staff-head.—The stability of the tripod is of the utmost importance. The ordinary staff-head is defective, from the impossibility of properly tightening the joint pivots as they become worn. The new staff-head—an adoption of a plan of W. Froude, Esq., C.E.—has the cheeks cast on to a circular plate, the leg joints being similar to an inverted mortar, with strong

trunnions, which can be tightened in their bisected cylindrical bearings by means of capstan-headed screws.

The ball-joint and clamp.—This ball-joint is substituted for the ordinary parallel plates, which are limited in their action, compelling the staff-head to be placed within 3° or 4° from a horizontal plane, making the tripod subservient to the level. By the ball-joint, you may set the tripod more firmly upon the ground, almost irrespective of the position of the level, the ball having a movement of nearly 20°. The instrument is approximately set by means of the circular bubble.

Mode of suspending the telescope.—The telescope is

PASTORELLI, F., & Co.—*continued.*

soldered to a saddle-piece, the base of which is made parallel to the axis. Two cylindrical gun-metal collars, very accurately turned and ground to a uniform diameter, are soldered to the telescope, and by means of these, the mechanical and optical axes of the telescope, and the line of collimation are adjusted; the spirit level being framed parallel thereto, and dead-fitted, neither admits nor requires any after adjustment. The saddle-piece is dead-fitted to the gun-metal centre or pivot, so that when the instrument is turned in any direction, the spirit bubble will be kept in the centre of its run.

The arrangement of the diaphragms.—The diaphragms are two separate discs; the horizontal web mounted on one, and the vertical web on the other. They can be moved independently of each other by means of the collimating screws. These screws are so arranged that they cannot be accidentally disturbed, being imbedded and covered by a cylindrical ring cap.

General summary of its advantages.—These instruments are less in weight and more portable than ordinary levels; they can be carried in a sling leather case, like a military telescope, with an increased stability of tripod, and capability of being adjusted with more facility and precision than the ordinary "Dumpy," and when adjusted are not liable to derangement; they can also be more readily set up for use, especially on hilly ground.

PASTORELLI'S PATENT MEASURING LEVEL.—For avoiding the necessity for chaining distances. This level embraces very important additions to the one above described, by which distances may be accurately measured; saving all the loss of time and the not unfrequent serious errors which occur when chaining them.

£ s.

Pastorelli's improved level, 12 or 14 inch .	price	14	14
Ditto, ditto, 16 or 18 „ . „		16	16

Additional webs and adjustments can be fitted to existing levels at a cost of from 20s. to 30s.

Levelling staves.—Ordinary staves can be used for ascertaining distances by means of the above measuring level, but staves slightly altered as to their mode of marking, will be found more suitable, as the divisions for estimating distances are separate from those used for levelling, and have no figures near them to confuse the observer.

PASTORELLI'S & Co.'s IMPROVED PRISMATIC COMPASS.—The prism being fixed at the back of the bisected web, the bisection of any object with the division on the silver ring, is more readily and distinctly seen than in those of the ordinary construction.

MATHEMATICAL DRAWING INSTRUMENTS.

FROUDE'S PROPORTIONAL COMPASS.—This instrument is arranged like a pair of ordinary "wholes and halves," but with these exceptions, that the legs are of equal length, one pair being jointed that they may be bent upwards towards the centre. The merit of the instrument is that it can at once be set not only to any known ratio, but to any ratio which is not known, but which is only indicated by the length of two given lines. The instrument being set to this ratio, its value can be immediately ascertained by referring to a graduated scale. It is peculiarly suitable in cases where fractional measurements are concerned and for which ordinary proportional compasses cannot be employed.

FROUDE'S IMPROVED BEAM COMPASS.—This instrument comprises many improvements over those in ordinary use, the chief being that by means of wheels fitted to each end of the beam, it is supported on the table in an upright position. By this arrangement great facility in use is obtained. Being self-supported it can be made slightly to recede from the work by a touch, and thus be always at hand. The beam also lying close to the work insures steadiness, the points being short. The pencil and ink legs are kept from the paper by means of a spring, which the

slightest pressure overcomes when they are required to draw a line.

MATHEMATICAL DRAWING INSTRUMENTS, in sets or separate, to suit the requirements of military and civil engineers.

METFORD'S IMPROVED POCKET SCALES, suitable for civil engineers, architects, and land surveyors, price, in case, 2*l.* 16*s.*

STANDARD METEOROLOGICAL INSTRUMENTS WITH KEW VERIFICATIONS.

STANDARD BAROMETER mounted in brass body, ivory point in glass cistern which forms the zero of the scale, mercury boiled in the tube. The internal diameter of tube is '75, divided on silver to reach to $\frac{1}{500}$ of an inch, with French scale reading by Vernier to $\frac{1}{50}$ of a millimetre suspended by brackets to mahogany board, 2*l.*

SMALLER INSTRUMENT, internal diameter of tube '34. In every other respect identical with the above, 8*l.* 10*s.*

STANDARD MOUNTAIN BAROMETER (upon the same principle) IMPROVED, by which the two verniers are read with great facility and exactness, divided on silver, reaching to about 22,000 feet of elevation, with tripod stand in sling case, 7*l.* 10*s.*

HYSOMETRICAL APPARATUS for measuring altitudes by the boiling point of water, on Dr. Wollaston's principle; the thermometers, engine-divided and etched upon their own stems to show distinctly the tenth of a degree; the apparatus employed is of the most portable kind, and packs in a strong leather case, price 4*l.*

METAL MARINE BAROMETER, Admiralty pattern, price 4*l.* 4*s.*

STANDARD THERMOMETERS, engine-divided and etched upon their own stems on brass. In morocco cases, price 1*l.* 15*s.*

STANDARD MAXIMUM THERMOMETER, on Professor Philip's principle, divided upon its own stem, mounted on brass or boxwood, price 15*s.*

STANDARD MINIMUM THERMOMETER, as above, price 15*s.*

SOLAR RADIATION MAXIMUM THERMOMETER, insulated as suggested by Sir John Herschel, Bart., price 18*s.* 6*d.*

WET AND DRY BULB REGISTERING MAXIMUM AND MINIMUM THERMOMETERS, divided upon their own stems, mounted on metal, and fixed to mahogany supports, price 2*l.* 5*s.*

MASON'S HYGROMETER divided and etched on the stems, upon metal stands resting upon a broad base, 1*l.* 15*s.*

REGNAULT'S HYGROMETER, 3*l.* 10*s.*

DANIEL'S HYGROMETER, 2*l.* 10*s.*

All the above Thermometers have the Kew verifications.

MERCURIAL NIGHT THERMOMETER, new form, 1*l.* 5*s.*

A SET of PORTABLE THERMOMETERS, for alpine travelling.

SYMPIESOMETER, for taking altitudes, a new form, in brass frame, most portable and light, suited for travellers, 3*l.* 3*s.*

RAIN GAUGES, from 10*s.* 6*d.* to 2*l.* 2*s.*

These can be made so portable that they may be carried in the pocket.

ANEMOMETER, a modification of Dr. Robinson's, registering the velocity of the wind in miles and furlongs, price 4*l.* 4*s.*

The exhibitors manufacture all kinds of microscopes, binocular field and opera glasses, military and naval telescopes, spectacles, &c.

PILLISCHER, M., 88 *New Bond Street, W.*—Optical instruments of various kinds, principally microscopes.

[Prize Medals have been awarded to M. Pillischer at the Great Exhibition of 1851, and Paris, 1855.]

Description of PILLISCHER'S No. 1 First Class Microscope.

Largest size Improved Compound Microscope, having a stage five-eighth inch thick, and allowing of nearly one and a half inch motion in rectangular directions, sliding and rotating object plate and sliding spring holder, a secondary stage underneath the object stage, with rectangular rotatory and vertical movements for the adjustment of achromatic condenser and other apparatus, large concave and plano mirrors, diaphragm, the optical tube has coarse and fine adjustments, and draw tube with rack and pinion

movement, and indicator divided into tenths to the inch for the facilitation of micrometric and erector measurements ; Wenham's binocular arrangement with rack and pinion adjustment to the eye-pieces and extra single tube ; Nos. 1, 2, 3, and 4, eye-pieces, glass stage, stage forceps, two live boxes, large bull's-eye condenser for opaque objects, polarizing apparatus and selenite stage, stage condenser, silver side reflector, parabolic reflector, camera lucida, compressorium, micrometers, achromatic condenser with stops and diaphragms, Brook's double nose piece, an erecting eye-piece, 2 inch, 1 inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, and $\frac{1}{8}$ inch object glasses of large angular aperture, and great penetrating power ; the whole fitted into an elegant Spanish mahogany or walnut plate-glass case with several drawers for the different apparatus, &c.

£90

A smaller Microscope having one inch motion to the stage, and similar in all other respects to the above

£82

Microscopes of simpler construction than the above, but equally useful in many respects, from

£20 to £40



PILLISCHER'S No. 1 FIRST-CLASS MICROSCOPE.

PILLISCHER, M.—*continued.*

PILLISCHER'S STUDENTS' MICROSCOPES.

Fig. 1. — A microscope with coarse and fine movements to the optical tube, plain stage, concave and plano mirrors, diaphragm, one eye-piece, 1-inch and $\frac{1}{4}$ -inch object-glasses of the respective angle of apertures of 16° and 75° , the whole packed in a neat mahogany case, about 7 inches by $6\frac{1}{2}$ inches, 7*l.* 7*s.*

Fig. 2.—Microscope with best rack and pinion stage, coarse and fine movements to the optical tube, concave and plano mirrors, diaphragm, 1-inch and $\frac{1}{4}$ -inch object-glasses 16° and 75° , two eye-pieces, live box, stage forceps, condenser for opaque objects, polarizing apparatus, and selenite parabolic reflector, and best Spanish mahogany or oak case, 10 inches by $6\frac{1}{2}$, 15*l.* 15*s.*

Fig. 3.—Pillischer's New £5 Microscope.—This microscope has been constructed with a view of supplying the

public with a really good and useful instrument, equal, in many respects, to the more costly ones, the prices of which, owing to their delicate, and, in some instances, complicated construction, are very much beyond the reach of the general public.

The great merit of this instrument is its simple construction and portability, and being furnished with a moveable stage, invented by Mr. Pillischer, of great usefulness, and with a new combination object-glass, forming three different powers of 1-inch, $\frac{1}{2}$ -inch, and $\frac{1}{4}$ -inch focal distances. These advantages, together with the excellent form of stand, which combines lightness and stability, and to which any form of apparatus can be adapted, make it the most useful instrument ever before submitted to the public at so low a price.

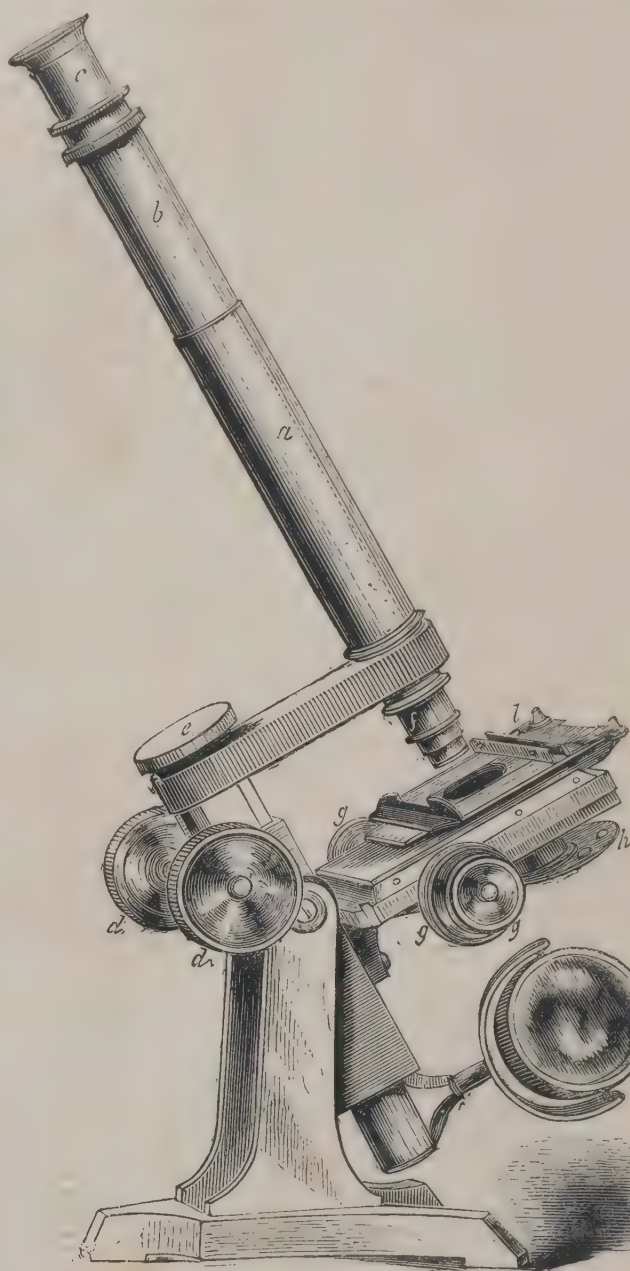


Fig. 2.

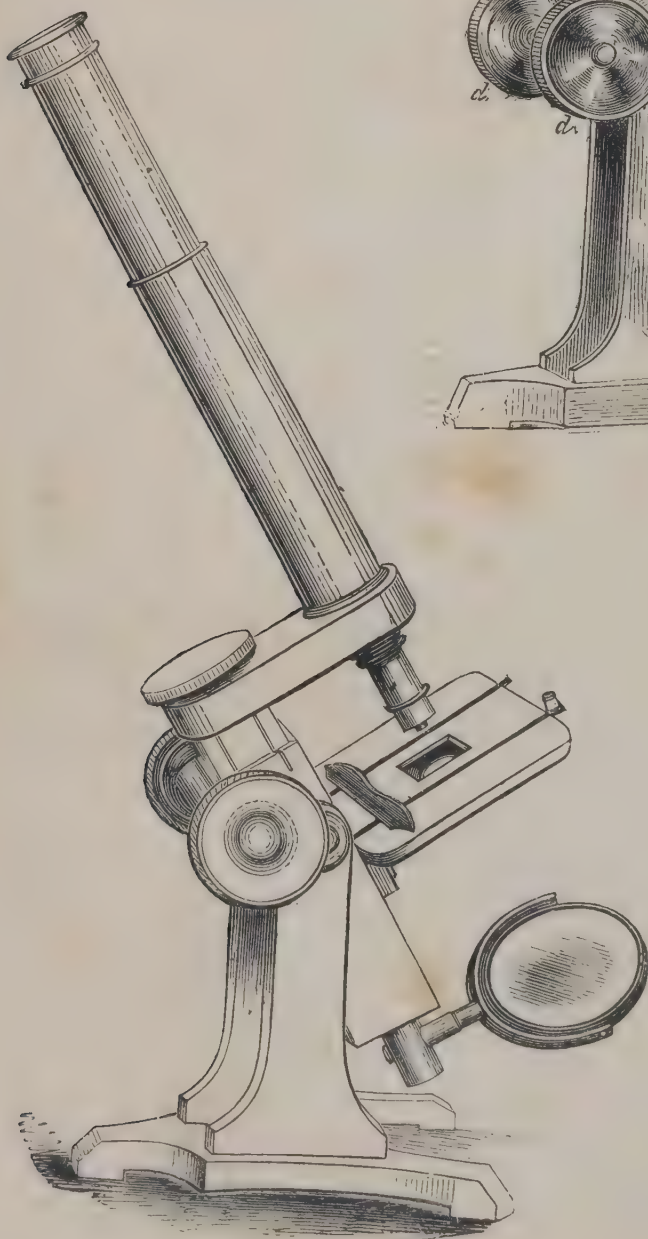


Fig. 1.

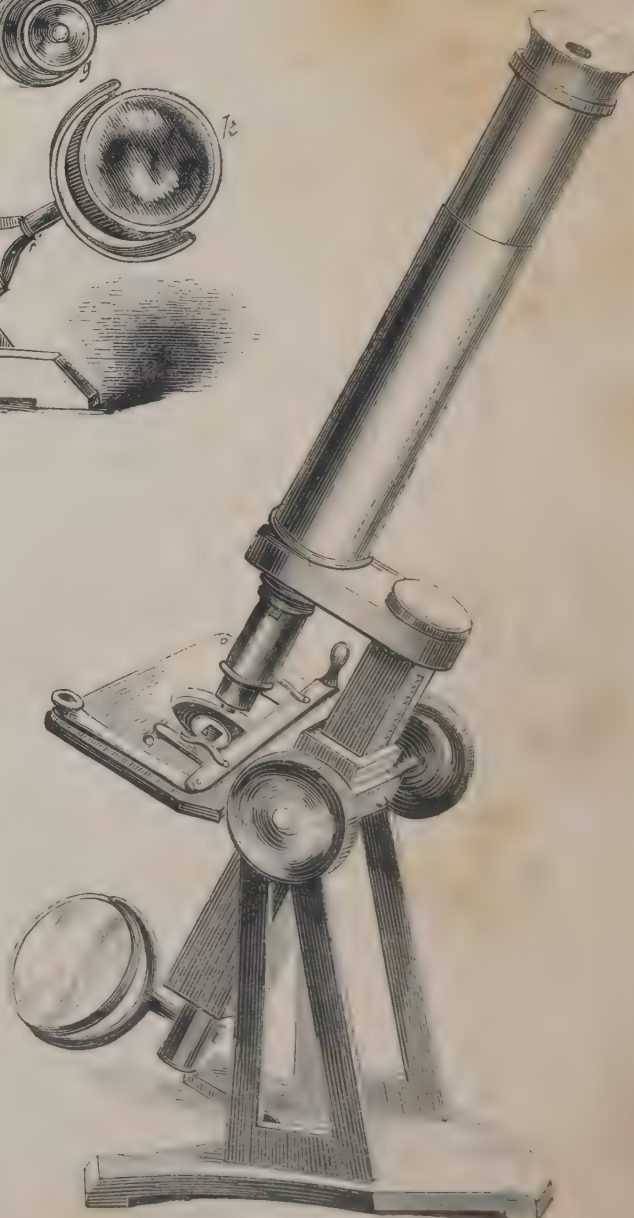


Fig. 3.

PILLISCHER, M.—*continued.*

PILLISCHER'S READING AND MICROSCOPIC LAMPS.

Patronized by Her Majesty, H.R.H. the Prince Consort, the Royal Family, many Scientific Societies, and most of the Nobility and Gentry of the United Kingdom.

These celebrated lamps, so well known now by the name of "PILLISCHER'S Reading and Microscopic Lamps," combine all the advantages sought for by the scientific public, they emit a very pure white and steady light without smoke or disagreeable heat, although the common colza oil only need be used: they burn very economically, the cost of the largest size having an illuminating power equivalent to six wax candles or more, not being a half-penny per hour. Their

chief recommendation, however, is in the simplicity of the construction and management, and they can be used by any one previously unacquainted with the use of lamps.

These lamps can be used in India or any other tropical climate, since they burn the cocoa-nut oil, and can be adapted to burn perfectly steady under the Punka.

Fig. 1 represents the largest size, Queen's Pattern, so called, it being used by Her Majesty.

Fig. 2 is the same size, with an ornamental reservoir.

Fig. 3 is mounted in china, and beautifully painted with figures or flowers, and forms no unpleasant addition of a drawing-room furniture.

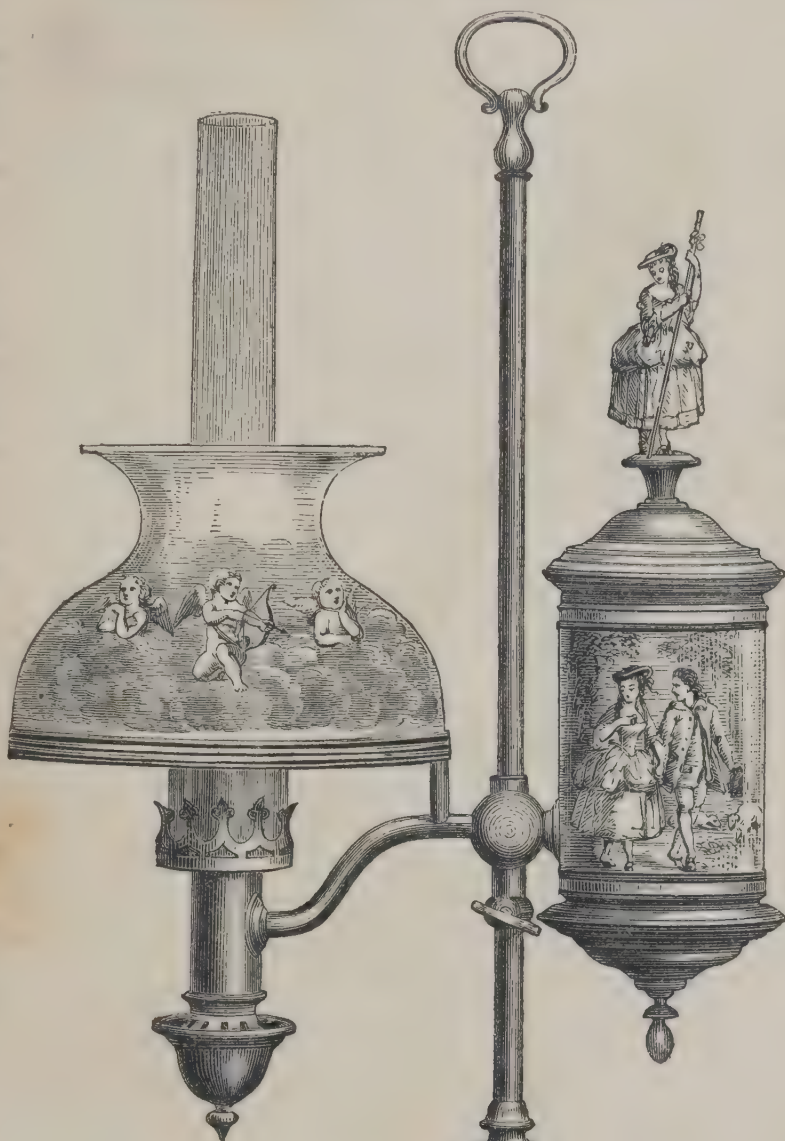


Fig. 3.

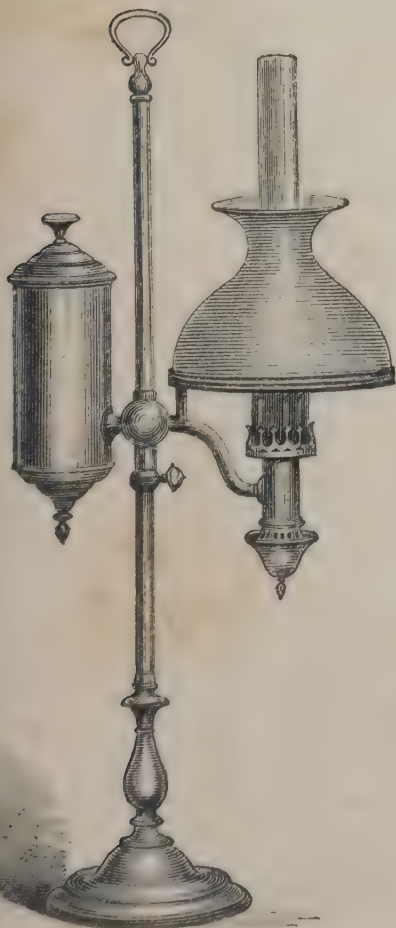


Fig. 1.

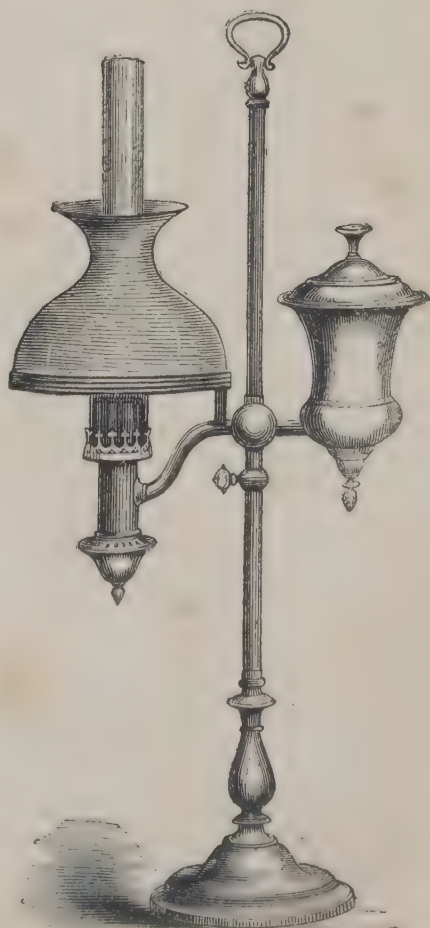
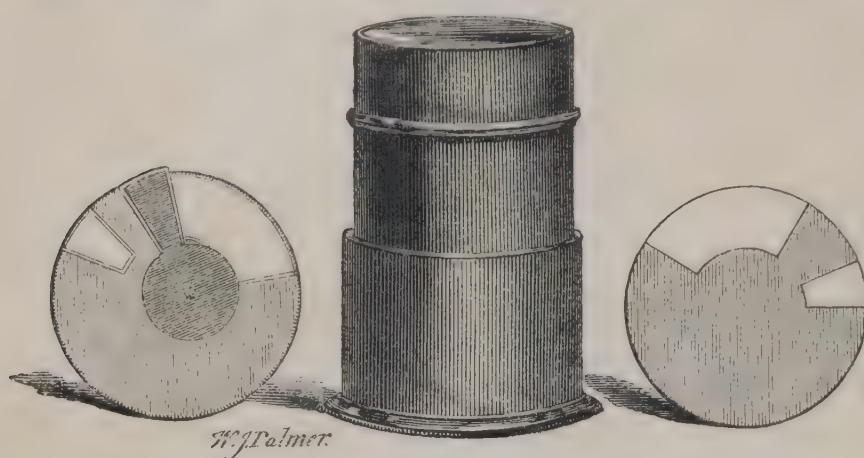


Fig. 1.

Illustrated Catalogues to be had at the Manufactory, 88 New Bond Street, W.; or, the Exhibition, Class XIII., Philosophical Instruments.

[2948]

READE, REV. J. B., F.R.S., *Ellesborough Rectory, Tring*.—Hemispherical condenser for microscopes, illustrating a new principle in microscopic illumination.



The CONDENSER consists of a hemisphere of glass, about $1\frac{3}{4}$ inches in diameter, with a new arrangement of stops, applicable to all condensers, for regulating the number, position, and magnitude of transmitted pencils of oblique light. The control thus obtained over the illumination of test-objects under any magnifying power, not only enables a single lens to compete with expensive achromatic condensers, but it also, for the first time, brings difficult test objects under the command of half-inch object-glasses, and thus tends to advance microscopic investigation, by saving the cost of hitherto necessary apparatus. The hemisphere is set in a thin brass ring, and screws upon a cylinder, adapted, like other fittings, to the sub-stage of the microscope. Its plain surface is covered by two similarly pierced diaphragms, shown half size in the engraving, and by the rotation of the upper diaphragm, the lower being fixed, one, two, or three apertures for transmitted light may be obtained, with distances between them varying from 30° to 120° . On taking out the eye-piece and looking down the body of the microscope, the points of light ought to be seen, and they should continue in view throughout the entire circular rotation of the sub-stage, otherwise the condenser is not truly central. The size of the apertures

found best in practice is 24° at the circumference, and $\frac{1}{10}$ ths of an inch in the direction of the radius; and in condensers of smaller diameter the latter dimension should never exceed half the radius. A small central aperture, closed by an eccentric shutter, is used for adjustment and for central illumination. In the application of this condenser to the resolution of lined test objects, the principle sought to be carried out is to throw the axis of the illuminating pencil in a direction at right angles to the line to be resolved. To illuminate a rectangularly marked valve, for instance, one point of light must lie over the end of the valve for bringing out the horizontal lines, and another be opposite the side of the

valve to act on the longitudinal lines; and resolution into dots or squares will be readily effected by adjusting the distance of the condenser. The two apertures used in this case are necessarily 90° apart, whilst for the *Pleurosigma angulatum*, and other objects with trilinear markings, three apertures are necessary at intervals of 60° , and many bilinear oblique markings are best seen with two apertures 120° apart. Under this new arrangement of small illuminating pencils, that portion of the light of the ordinary spot lens, which really tends to obliterate the shadows by throwing them in directions opposite to each other, is stopped out,—the markings, whether elevations or depressions, are illuminated on the same side, and we preserve that uniform direction of the shadows which is the key to accurate definition. With this condenser scales of the *Podura*, and objects capable of reflecting light, can be viewed upon a black ground by bringing a single pencil of light so near to the stage of the microscope as to be beyond the angle of aperture of the object-glass. It is always desirable to use direct rather than reflected light, the source of light being placed about 10 inches from the condenser.

[2949]

REID BROTHERS, 25 *University Street, and Wharf Road, City Road*.—Electric telegraph materials.

[2950]

ROGERS, JOSEPH, 215, 216 *Gresham House, City*.—Telegraph wires and cables—patented.

[2951]

RONCHETTI, JOHN B., 9 *Cambridge Street, Golden Square*.—Hydrometers and thermometers.

[2952]

ROSS, THOMAS, 2 & 3 *Featherstone Buildings, Holborn*.—Optical instruments; microscopes; telescopes and photographic lenses, &c. (See pages 36 & 37.)

[2953]

SALMON, W. J., 100 *Fenchurch Street*.—Binocular and achromatic microscopes.

[2954]

SAX, JULIUS, 8 *Hatton Garden, E.C.*—Chemical and bullion balances on an improved style, and weights of the finest description.

The following are exhibited :—

A CHEMICAL BALANCE, in German silver, with 14 in. beam, to carry 1000 grains in each pan, and turn, when loaded, with 1000th part of a grain.

A BULLION BALANCE, with 18 inch beam, to carry

100 ounces in each pan, and turn, when loaded, with 30th part of a grain.

A set of TROY WEIGHTS in mahogany box, from 100 ounces to 1000th part of an ounce.

[2955]

SCOTT, WENTWORTH E., *Westbourne Park, London*.—1. Self-registering maximum thermometer for deep sea, &c. 2. Microscopic specimens.

[2956]

SHARPE, E. BENJAMIN, *Hanwell Park, Middlesex*.—Improvements in submarine electric telegraphs, paying-out machinery, &c. (Sharpe's patent).

[2957]

SHARP, HENRY, 38 *Bowden Street, Sheffield*.—Achromatic microscope objectives.

[2958]

SHAW, WILLIAM THOMAS, Inventor, 6 *Park Villas, Dalston, N.E.*—Stereotrope or stereoscopic thaumatrope.

[2959]

SIEMENS, HALSKE, & Co., 3 *Great George Street, Westminster*.—Telegraphic apparatus for land and submarine lines.

[2960]

SILVER, S. W., & Co., 3 *Bishopsgate Street*.—Electrical machine fitted with ebonite.

[2962]

SPENCER, BROWNING, & Co., 111 *Minories, London*.—Telescopes, Crooke's spectrosopes, pocket and improved aneroid barometers, and nautical instruments.



	£	s.	d.
LONG RANGE ANEROID BAROMETER, S. B. & Co.'s			
PATENT	2	10	0
Compensating ditto, uninfluenced by temperature	4	4	0
Long range aneroid for the waistcoat pocket,			
in gold case	15	15	0
Long range aneroid in silver case	5	5	0
Long range aneroid, in metal case	4	4	0
Crooke's pocket Spectroscope for "Spectrum			
analysis"	3	13	6
Crooke's large model "Spectroscope" (see			
illustration)	20	0	0

[2963]

SMITH, EDWARD, 16 *Queen Anne Street, London*.—Spirometer; potash-box to abstract carbonic acid during expiration.

[2964]

SMITH, BECK, & BECK, 6 *Coleman Street, E.C.*—Achromatic microscopes; objects; achromatic stereoscopes; cabinets; and other optical instruments.

[2965]

SMYTH, C. PIAZZI, *Edinburgh*.—Rotary ship clinometer; model of compound rotary apparatus; electric registering anemometer.

[2966]

SPRATT, ALICE, 118 *Camden Road Villas, London*.—Electric weather indicator.

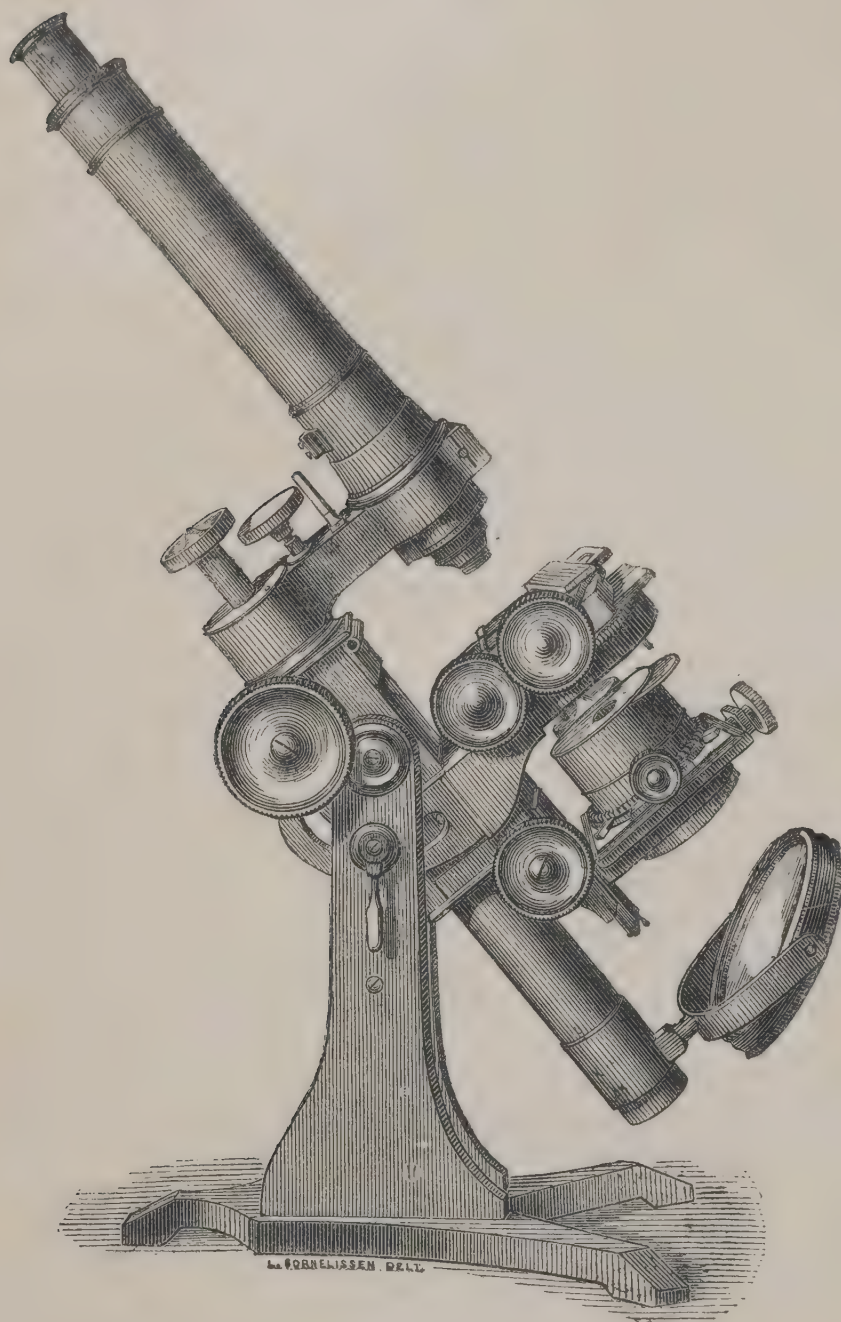
[2967]

SPRATT, JAMES, 118 *Camden Road Villas, London*.—Lightning conductors; reproducing points; lock insulator and attachments—patented 1861.

[2968]

STANLEY, W. F., 3 *Great Turnstile, W.C.*—Mathematical and surveying instruments.

ROSS, THOMAS, 2 & 3 Featherstone Buildings, Holborn.—Optical instruments; microscopes; telescopes; photographic lenses, &c.



A large compound microscope, No. 1A, with Wenham's binocular arrangement; a concentric rotating stage, having one inch of motion in rectangular directions, rack and fine-screw movements to the optical part; clamping arc for fixing the instrument at any inclination; secondary stage for holding and adjusting by universal motions all the illuminating and polarizing apparatus beneath the object; flat and concave mirrors, diaphragm plate and apparatus complete (*see list*), packed in mahogany cabinet case.

A ditto, ditto, No. 1B, with Wenham's binocular arrangement; an ordinary rotating object-plate to the stage, and apparatus in mahogany cabinet case.

A smaller binocular microscope, No. 2, having three-quarters of an inch of motion, and ordinary rotating object-plate to the stage, with apparatus, in mahogany portable case.

A smaller microscope, No. 3, having three-quarters of an inch of motion, and ordinary rotating object-plate to the stage, with apparatus, in mahogany case.

A plain microscope (basis of the above, No. 3), in mahogany cupboard case.

Apparatus for the compound microscope.

Achromatic object-glasses for microscopes, with flat field, perfect marginal definition and the maximum aperture consistent with the required performance:—

3 inches, 12 degrees angular aperture.

2	„	15	„	„	„
1½	„	20	„	„	„
1	„	15	„	„	„
1	„	25	„	„	„
¾	„	35	„	„	„
½	„	90	„	„	„
⅓	„	110	„	„	„
¼	„	100	„	„	„
⅓	„	140	„	„	„
⅓	„	140	„	„	„
⅓	„	140	„	„	„
⅓	„	150	„	„	„

A, B, C, D, E, and F, eye-pieces.

Erecting eye-piece.

Micrometer eye-piece.

Screw micrometer.

Jackson's micrometer.

Stage micrometer.

Goniometer.

Lieberkuhn's reflectors for opaque objects.

Side reflector.

Side condensing lens.

Condensing lens, with universal motions, on stand.

Brooke's double nose-piece, for rapidly changing the object-glass.

Wollaston's camera lucida.

Neutral tint do.

Millar's thin glass do.

Polarizing apparatus, with two selenites.

Darker's revolving selenite stage, and set of three selenites.

Double image prism.

Achromatic condenser for illuminating transparent objects.

Kingsley's illuminator, with diaphragms.

Reade's hemispherical condenser.

Parabolic illuminator (or paraboloid) for dark-ground illumination.

Small spotted lens for test objects.

Amici's prism, with universal motion, on stand.

Ross's centring glass.

Lister's dark wells.

Rainey's light modifier.

Plate for fixing fish, frogs, &c.

Animalculæ cages (3 sizes).

Ditto, for high powers.

Compressorium.

Wenham's ditto.

Set of animalculæ tubes in case.

Stage forceps.

Phial ditto (2 sizes).

Page's wooden ditto.

Writing and cutting diamonds.

Instrument for measuring thin glass.

Machine for cutting discs of ditto.

Paraffin lamp on adjusting stand.

Apparatus for producing photographs of enlarged microscopic objects.

ROSS, THOMAS—*continued.*

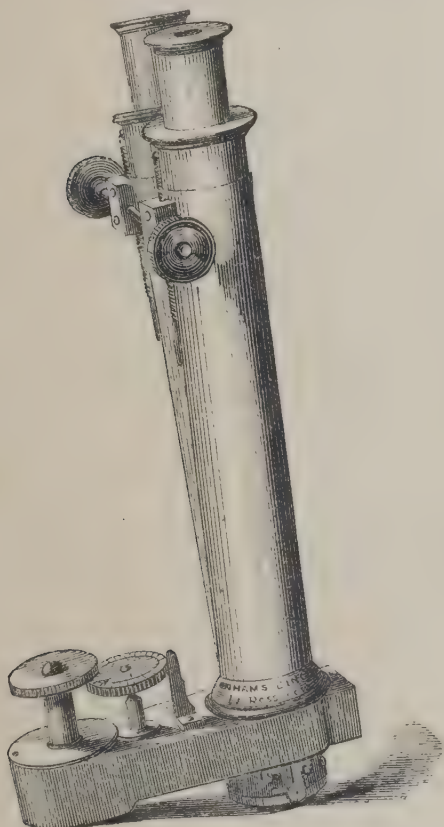
SIMPLE MICROSCOPES.

A simple microscope, with 1 in., $\frac{1}{2}$ in., $\frac{1}{4}$ in., and $\frac{1}{10}$ in., single lenses; $\frac{1}{20}$ in. Wollaston's doublet, Liberkuhn for $\frac{1}{2}$ in. and $\frac{1}{4}$ in. lenses, and stage forceps, in mahogany case.

A magnifying stand, with universal motions, and two lenses, for dissecting.

A diatom finder (field hand-microscope), with screw adjustment, cage, and single lens.

Coddington lenses and pocket magnifiers.



TELESCOPES.

The contact surfaces of the object-glasses of these instruments are united by a permanently transparent cement, obviating the loss of light by reflection, and preventing the decomposition of the glass.

Three portable telescopes, in German silver, brass, and aluminium mountings, opening from 5 inches to 20

inches; clear aperture $1\frac{1}{8}$ inch, magnifying power 17 times.

Three ditto, ditto, opening from $6\frac{3}{4}$ inches to 20 inches; clear aperture $1\frac{3}{8}$ inch, magnifying power 20 times.

Three ditto, ditto, opening from $8\frac{1}{2}$ inches to 28 inches; clear aperture $1\frac{1}{2}$ inch, magnifying power 20 times.

Three ditto, ditto (pancratic), opening from $12\frac{1}{2}$ inches to 43 inches; clear apertures $2\frac{1}{8}$ inches, and $2\frac{3}{4}$ inches, magnifying powers 30, 40, and 50 times.

One naval telescope, in German silver mountings, with one draw, opening from 17 inches to 23 inches; clear aperture $1\frac{1}{2}$ inch, magnifying power 14 times.

Two ditto, ditto, opening from 24 inches to $29\frac{1}{2}$ inches; clear apertures $1\frac{5}{8}$ in. and $2\frac{1}{8}$ in., magnifying power 20 times.

Two ditto, ditto (pancratic), opening from $37\frac{1}{2}$ inches to 43 inches; clear apertures $2\frac{1}{8}$ in., and $2\frac{3}{4}$ in., magnifying powers 30, 40, and 50 times.

One signal ditto, ditto (pancratic), with jointed body, opening from 55 inches to 60 inches; clear aperture $2\frac{3}{4}$ in., magnifying powers 50, 60, and 70 times. Packed in case.

One deerstalking telescope, in brass mountings, opening from $8\frac{1}{2}$ in. to $19\frac{1}{2}$ in.; clear aperture $1\frac{1}{4}$ in., magnifying power 14 times.

Three ditto, ditto, in brass and aluminium mountings, opening from 10 inches to 29 inches; clear apertures $1\frac{1}{2}$ in. and $1\frac{3}{4}$ in., magnifying power 20 times.

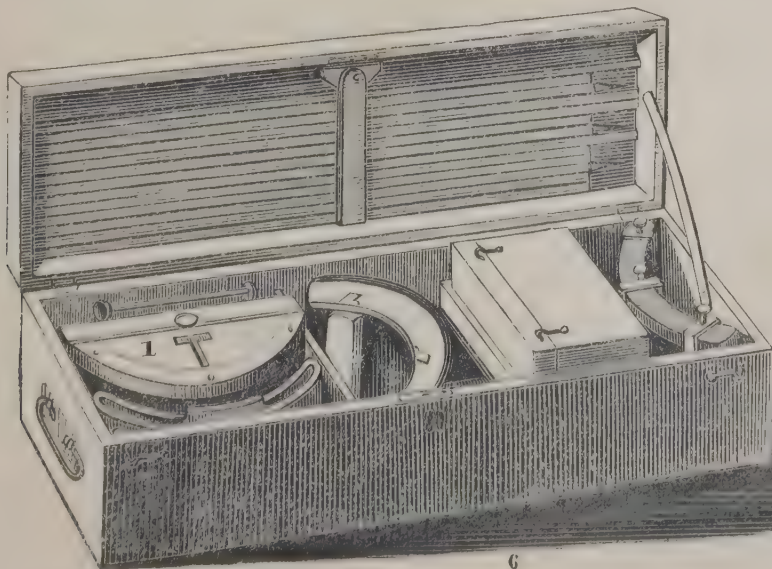
Three ditto, ditto (pancratic), same length and apertures as the preceding, magnifying powers 20, 25, and 30 times.

Two ditto, ditto, same length as the preceding; clear aperture $2\frac{1}{8}$ inches, magnifying power 20 times.

One 33 inch telescope, with brass tube, rack-and-pinion adjustment, and brass table-stand; clear aperture $2\frac{1}{10}$ inches. This instrument has a pancratic day eyepiece, powers 30, 40, and 50, and two astronomical eyepieces, powers 40 and 70. Packed in case.

Binocular field, race, and opera-glasses in various mountings.

Photographic lenses, various.



[2969]

STEVENSON, PETER, *Edinburgh*.—Instruments for brewers, distillers, and others; also scientific apparatus, &c.

[2970]

STEWART, BALFOUR, *Kew Observatory, Richmond, S.W.*—Self-recording magnetographs, and other philosophical instruments.

[2971]

SUBMARINE TELEGRAPH COMPANY, Chief Offices, 58 *Threadneedle Street*, and 43 *Regent Circus, Piccadilly*, L. W. COURTENAY, Secretary.—Samples of their submarine cables. (*See page 39.*)

[2972]

SUFFELL, Manufacturer, 132 *Long Acre, London, W.C.*—Improved adjusting, surveying, and drawing implements.

<p>The exhibitor has been a manufacturer of improved adjusting, surveying, and drawing instruments, &c., for a quarter of a century. Transit theodolites, 21<i>l.</i> Everett ditto, 20<i>l.</i> 5-inch ditto, 18<i>l.</i> Improved Gravatt level, 10<i>l.</i> Dumpy level, 7<i>l.</i> 10<i>s.</i> Surveying level, 4<i>l.</i> 10<i>s.</i> He also</p>	<p>manufactures the following measures and standards of all nations; every instrument requisite for surveyors, engineers, architects, and draftsmen. Cases of drawing instruments for all classes, from 5<i>s.</i> to 5<i>l.</i>; and the improved needle socket instruments as exhibited.</p>
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[2973]

SUGG, WILLIAM, *Marsham Street, Westminster*.—Photometer, gas governors, gas meters, and other apparatus.

[2974]

SWIFT, JAMES, 3 *Matson's Terrace, Kingsland Road*.—Improvements in mechanical construction of microscope; dispensing with rackwork throughout the instrument.

[2976]

TREE, JAMES, & Co., 22 *Charlotte Street, Blackfriars Road, London*.—Rules, scales, and levels for mechanical, scientific, and agricultural purposes.

[2977]

TYER, EDWARD, 15 *Old Jewry Chambers*.—Train signalling telegraphs and electric telegraphs. (*See pages 40 & 41.*)

[2978]

UNIVERSAL PRIVATE TELEGRAPH COMPANY, 448 *Strand, London*.—Wheatstone's (magneto-alphabetic) telegraphs for railways or private use.

[2979]

VARLEY, ALFRED, 1 *Raglan Terrace, Highbury*.—Apparatus for economically heating green-houses by gas, and regulating the temperature.

[2980]

VARLEY, CORNELIUS, 7 *York Place, Kentish Town*.—Ebonite electrifying machine; pair of single needle telegraph instruments; key and printing machine; differential galvanometer; resistance coils; microscope with lever stage.

[2981]

VARLEY, CROMWELL FLEETWOOD, 4 *Fortess Terrace, Kentish Town*.—Apparatus for indicating the distance of faults in telegraph conductors without calculation; insulators; constant batteries; telegraphic apparatus, &c.

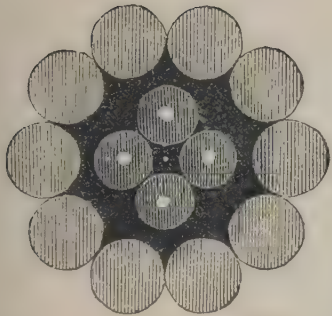
[2982]

VULLIAMY, L. L. & H. P., *Clapham Common, S.*—Model of an electro-magnetic motive engine.

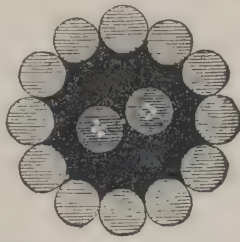
SUBMARINE TELEGRAPH COMPANY, Chief Offices, 58 *Threadneedle Street*, and 43 *Regent Circus, Piccadilly*, L. W. COURTENAY, Secretary.—Samples of their submarine cables.

The Submarine Telegraph Company is the only Company in exclusive communication with the Continent of Europe, the Channel Islands, Alexandria, and the East, via France, Belgium, Hanover, and Denmark.

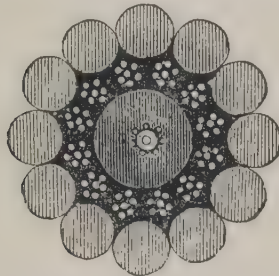
The following illustrations represent the Company's cables, now in perfect working order, showing 28 lines of telegraphic communication to the Continent, making in the aggregate a submarine conductor of 2777 miles:—



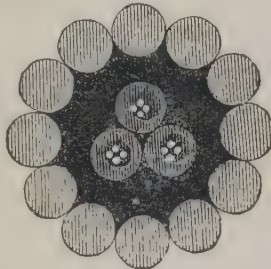
Dover and Calais.—Laid Sept. 1851; length, 24 miles. (First Submarine Telegraph cable ever laid.)



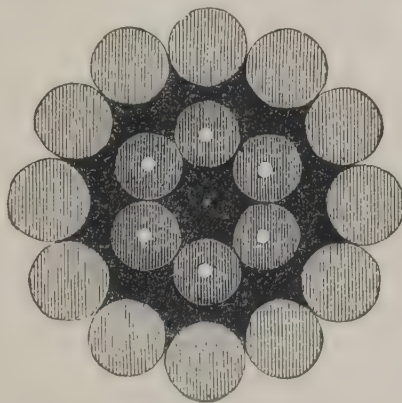
Cromer and Emden.
Laid Nov. 1858; length, 280 miles.



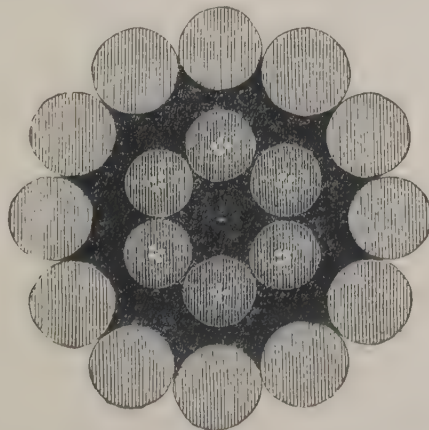
Jersey and Coutances.
Laid Jan. 7, 1860; length, 27 miles.



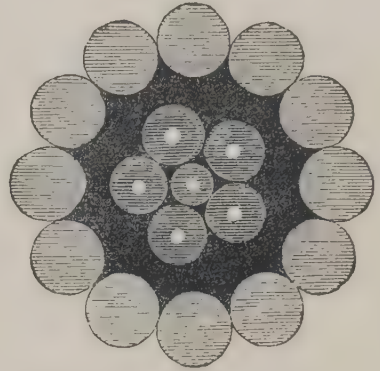
Cromer and Toning.
Laid July, 1859; length, 380 miles.



Beachy Head and Dieppe.
Laid June, 1861; length, 64 miles.



Folkestone and Boulogne.
Laid June, 1859; length, 25 miles.

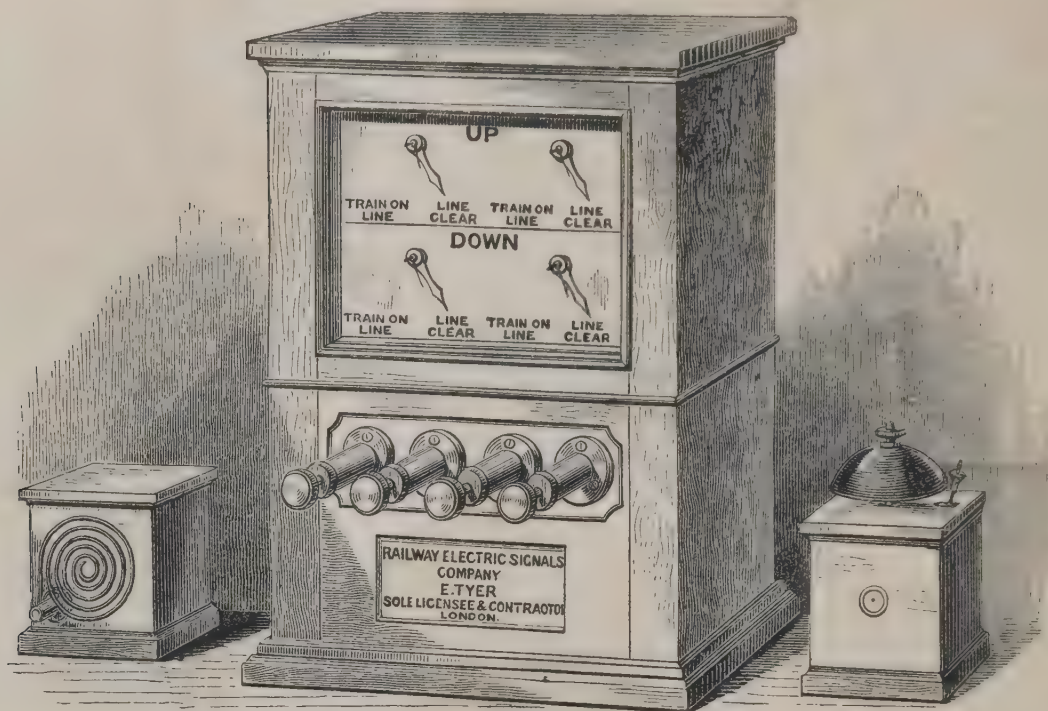


Dover and Ostend.—Laid May, 1853; length, 70 miles. (The Second Submarine cable that was laid.)



Tariff Lists and every information may be obtained at the chief offices, and at all the offices of the London District Telegraph Company.

TYER, EDWARD, 15 *Old Jewry Chambers*.—Train signalling telegraphs and electric telegraphs.



TYER'S TRAIN SIGNALLING TELEGRAPH.

System and description of Tyer's patent train signalling telegraphs :—

1. The line of railway is divided into certain portions or signal stations, and no train is to be permitted to pass one of these signal stations unless a notification of the line being clear has been received from the signal station in advance.
2. Each signal station communicates with the signal station on either side of it, so as to announce the approach and departure of every train.
3. The receiver of a signal cannot alter it; the sender alone is enabled to reverse it.
4. The signal once given remains fixed until the next signal be sent, and can therefore be referred to at any moment.
5. The dial of the instrument is divided into two parts: the UPPER part being for the *up line*, the LOWER part for the *down line*; each part has two needles or indicators, one black the other red. The *black* indicator is the last signal *received* at the station. The *red* indicator is the last signal *sent* from the station.
6. Each instrument is also furnished with a bell and gong.
7. Only two signals are used—"Train on Line," and "Line Clear."

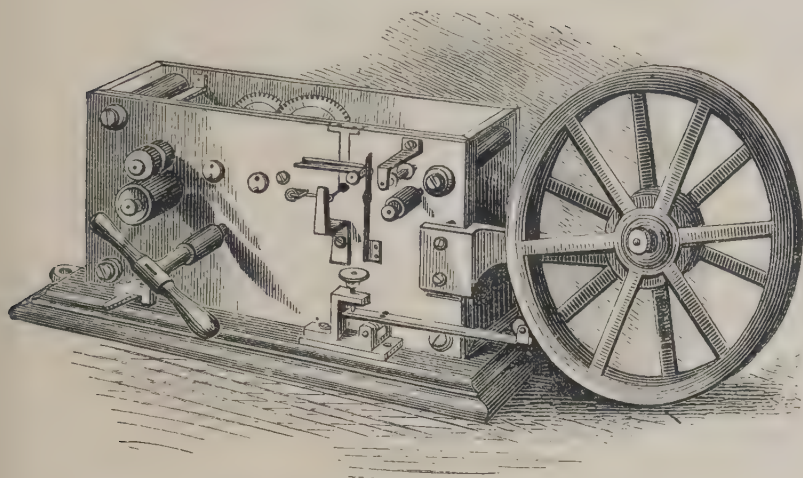
OBSTRUCTION CODE.

8. In the event of any obstruction happening upon the line, the signal "*Down Train on Line*," or "*Up Train on Line*," as the case may be, is immediately to be given, accompanied with FIVE distinct BEATS of the "*Bell*" or "*Gong*."
9. The station receiving such signal of obstruction will reply by sounding the "*Bell*" or "*Gong*" FIVE times, and immediately stop any approaching train, until the cause of obstruction has been ascertained or the indicator again shows "*Line Clear*."

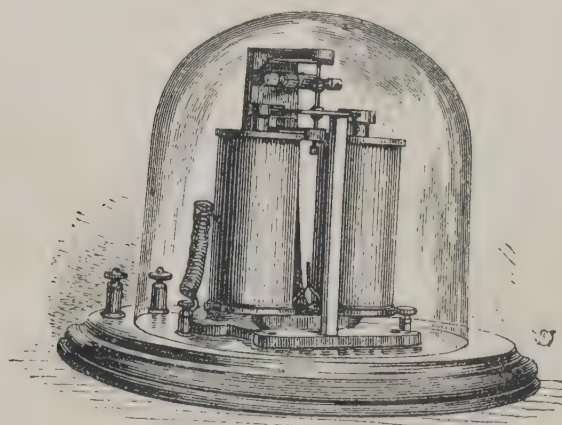
CODE FOR BELLS AND GONGS.

- | | |
|--|------------------|
| Down passenger trains | 2 beats on gong. |
| Down goods or mineral trains | 3 beats on gong |
| Up passenger trains | 2 beats on bell. |
| Up goods or mineral trains | 3 beats on bell. |
| Inspector's signal for testing instruments | 6 beats. |
| Acknowledgment of a signal | 1 beat. |
| Acknowledgment of obstruction code | 5 beats. |
| Acknowledgment of inspector's signal | 6 beats. |
10. Should the station to which a signal is sent, *not reply*, it must be *repeated* until such reply is *received*.
 11. No signal is to be considered *complete* until the *reply* has been *received*.

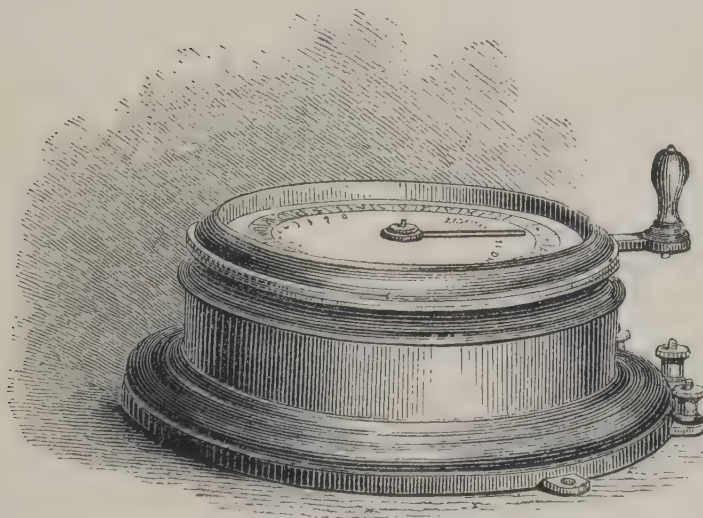
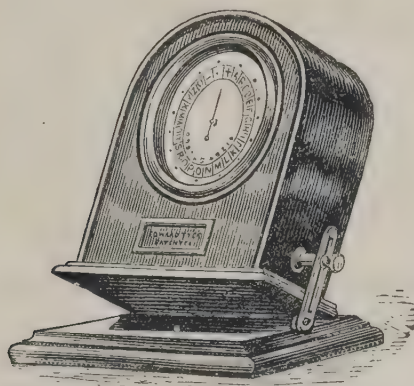
TYER, EDWARD—*continued.*



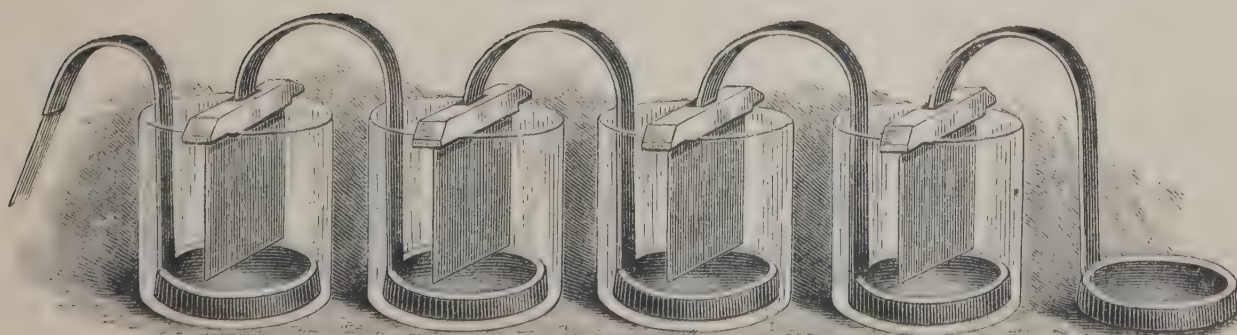
TYER'S PATENT DIRECT ACTION PRINTING TELEGRAPH.



TYER'S PATENT RELAY.



TYER'S PATENT ALPHABETICAL TELEGRAPH.



TYER'S PATENT MERCURIAL BATTERY.

[2983]

WALKER, CHARLES V., F.R.S., *Fernside, Red Hill*.—Telegraph instruments for making and for recording train-signals.

A pair of train-signal bells,—index, pecker, and platinized graphite battery complete. Employed for increasing the safety of railway travelling. The speciality of this apparatus (which does not form the subject of a patent) was the introduction of large wire, No. 16 or 18, for the electro-magnets of telegraph instruments, for actual use in direct circuit without the intervention of a relay. Hence extreme simplicity of structure and consequent cheapness are obtained; and an instrument is produced that is in the smallest possible degree liable to derangement. The first pair of bells were erected on the Greenwich viaduct of the South Eastern Railway, on January 31, 1852: the last pair on the Admiralty pier and station of the South Eastern Railway at Dover, on January 1, 1862. Every station, gate-house, and level crossing on the South Eastern Railway is furnished with one or more of these bells, 318 in all. A counting-index is attached to one or more bells, when several are in the same signal-box.

The ordinary train-signals are, one blow, two blows,

or three blows; each signal being repeated back in acknowledgment of its receipt: and all signals are booked.

Plain graphite was exhibited in 1851. Platinized graphite, in lieu of silver, is now used extensively and with great success.

A lino-scribe, for impressing upon cotton-thread red marks when bell-signals are given; and black marks when they are received; red and black to mark intervals of time. Mr. D. McCallum's idea worked into form and realized by the exhibitor.

McCallum's Globotype, constructed so as to drop red balls when bell-signals are given, and black balls when they are received; spotted balls to mark the hours, and blue balls the quarters or lesser intervals. The arrangement and details are by the exhibitor.

V-trough for tunnel and subterranean wires, giving a maximum of space and protection with a minimum of material, labour, and waste. Joints of the same; and a set of joint-tools.

[2984]

WALTER, JAMES, 17 *Water Street, Liverpool*.—Barometer and weather indicator. (See page 43.)

[2985]

WARNER, JOHN, 72 *Fleet Street, London, E.C.*—Improved apparatus for pictorial illustration; philosophical, mathematical, and optical instruments.

[2986]

WATSON, HENRY, *Newcastle-upon-Tyne*.—Armstrong's hydro-electric machine.

[2987]

WEBB, HENRY, *George Street, Balsall Heath*.—Naturalist and preparer of microscopic objects.

[2988]

WELLS & HALL, *Mansfield Street, Southwark*.—Telegraph conductors, caoutchouc insulation; submarine cables; wires for magnetic coils. (See page 44.)

[2989]

WENHAM, F. H., *Effra Vale Lodge, Brixton, S.*—A binocular microscope which may be used as an ordinary instrument.

[2990]

WEST, FRANCIS LINSELL, 31 *Cockspur Street, Charing Cross*.—Self-registering mercurial and standard barometers.

[2991]

WHITEHOUSE, NATHANIEL, 2 *Cranbourne Street*.—English-made opera-glasses, and Dr. Wollaston's spectacles, &c.

[2992]

WILDE, H., *St. Anne's Square, Manchester*.—The globe telegraph, for private telegraphic communication.

[2993]

WILKINS & Co., *Long Acre, London*.—Lighthouse apparatus.

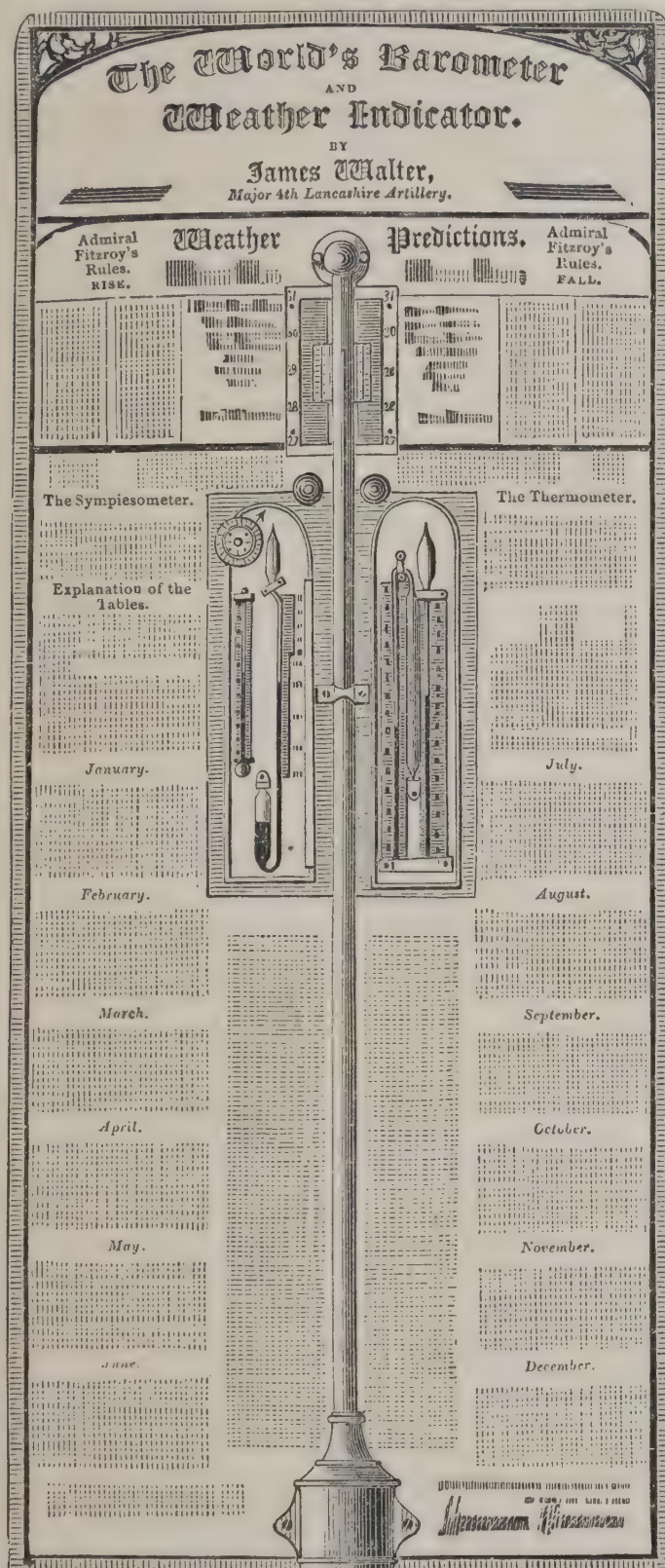
[2994]

WOOD, EDWARD GEORGE, 74 (late of 117) *Cheapside, London*.—Optical, philosophical, and photographic instruments.

[2995]

YEATES, ANDREW, 12 *Brighton Place, New Kent Road, London*.—Astronomical, geodetical, and nautical instruments; portable theodolite; improved prismatic compass.

WALTER, JAMES, 17 Water Street, Liverpool.—Barometer and weather indicator.



The WORLD'S BAROMETER and WEATHER INDICATOR.

Price (in mahogany frame, with Sympiesometer), five guineas.

This instrument is also made as a marine barometer, in cases specially designed and adapted for nautical purposes, and with suitable fittings for cabins.

Orders to be addressed to Wilson, Son, and Walter, Liverpool, or J. Bowden, 53 Gracechurch Street, London.

[2996]

YEATES & SON, 2 Grafton Street, Dublin.—Astronomical, meteorological, philosophical, and mathematical instruments.

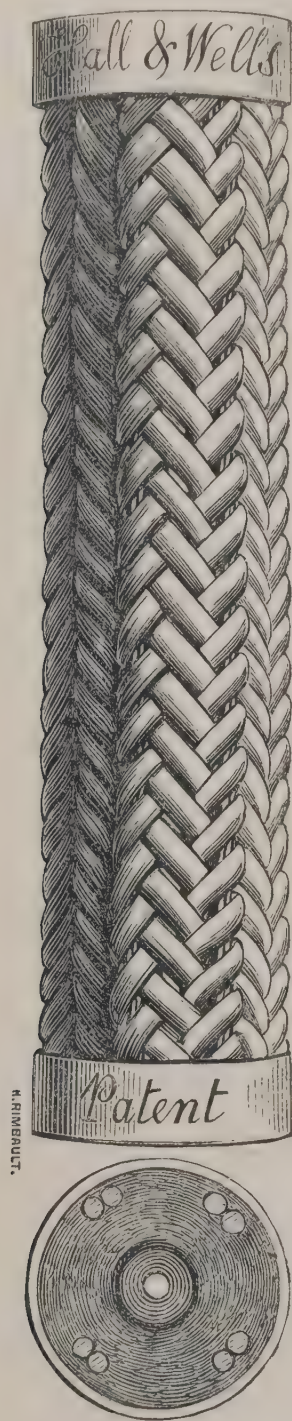
Two equatorially mounted TELESCOPES, on iron columns, the mounting possessing many improvements in detail. The clamping circles are quite independent of the divided circle, and at the opposite ends of their respective axes, that of the polar axis being directly under the northern pivot, and that of the declination axis, close to the telescope. The clamping arrangement also differs from that in present use, being more effective and perfectly free from strain or torsion; the smaller stand is particularly adapted for those who have no convenient space to erect an observatory upon; the iron column may be permanently fixed in the open air; the equatorial arrangement packs in a small box, from which it can be lifted into its place on the top of the column in a few moments, and may be thus placed and replaced at the observer's pleasure, without its adjustments being materially affected.

YEATES & SON'S NEW ELLIPTOGRAPH. This instrument differs in three essential points from all elliptographs hitherto constructed. First. There is no limit whatever to the variation in the proportions of the ellipses formed by it. Secondly, the facility of setting it to draw any ellipse whose major and minor axes are known; and thirdly, the accuracy of the figure formed by it in all proportions.

YEATES & SON'S LARGE PUBLIC BAROMETER—dial 3 feet in diameter. This form of instrument was designed by the exhibitors in the year 1858, for the use of agricultural districts and fishing towns, in both of which situations it has been found extremely useful. The index or hand is moved by the mercurial column.

YEATES & SON'S LARGE PUBLIC THERMOMETER—dial 3 feet in diameter. This instrument was designed by them last year (1861). The index or hand is moved by a bulb of mercury one inch in diameter.

WELLS & HALL, *Mansfield Street, Southwark.*—Telegraph conductors, caoutchouc insulation ; submarine cables, &c.



SUBMARINE TELEGRAPH CABLES (for deep sea) insulated with caoutchouc, having a specific gravity of 1·35, or heavier ; made with Russian hemp in combination with longitudinal steel wires, thereby preventing twisting, kinking, or any perceptible elongation, when strained to, and having a tensile strength equivalent to 11,635 fathoms in sea-water.—(*Government Report on Telegraphy*, pages xxviii & 389.)

The following are exhibited :—

1. Specimen of submarine cable, sheathed with galvanized iron wire, weighing six tons per mile, for shore ends.
2. Specimens of cable sheathed with galvanized iron wire, weighing four tons per mile, for shore ends.

3. Specimens of cable sheathed with galvanized iron wire, weighing two tons per mile, for shallow waters.
4. Specimen of cable sheathed with galvanized iron wire, weighing one ton per mile.
5. Specimen of cable sheathed with longitudinal steel wires and best Russian hemp, weighing ·82 ton per mile, for deep seas. Tensile strength equivalent to 10,840 fathoms.
6. Specimen of cable sheathed with longitudinal steel wire and best Russian hemp, weighing ·72 ton per mile, for deep seas. Tensile strength equivalent to 11,635 fathoms.
7. Specimens of light cables sheathed with galvanized iron wire, weighing 226 & 44 lbs. per mile.
8. Specimens of light cables sheathed with galvanized iron wire.
9. Specimens of caoutchouc or india-rubber, insulated wires.
10. Multiple cable, 10 wires, insulated with caoutchouc, for aërial telegraphs, &c.
11. Multiple cable, 30 wires, insulated with caoutchouc, for aërial telegraphs.
12. Multiple cable, 50 wires insulated with caoutchouc, for aërial telegraphs.
13. Caoutchouc insulated wire ; diameter of conductor (7 strand) ·02925, for deep-sea telegraphs.
14. Caoutchouc insulated wire, diameter of conductor ·03721.
15. Caoutchouc insulated wire, diameter of conductor ·00871, weight per mile 3·5 lbs.
16. Caoutchouc insulated wire, diameter of conductor ·0079.
17. Specimens of wires for target purposes (grouped).
18. Specimen of Swedish wire, diameter ·02564, served with silk.
19. Specimen of Swedish wire, diameter ·0139, served with silk.
20. Specimen of Swedish wire, diameter ·00871, served with silk.
21. Specimen of Swedish wire, diameter ·0079, served with silk.
22. Specimen of Swedish wire, diameter ·0033, served with silk.
23. Specimens of Swedish wires, braided with silk, and containing two wires (diameter ·0079) and upwards.

[2997]

YOUNG, JOHN, Gas Engineer, *Dalkeith*.—Manufactured carbon for electrical batteries, and electrodes for electric lights.

[2998]

INTERNATIONAL DECIMAL ASSOCIATION, PROFESSOR LEVI, *Farrar's Buildings, Temple*.—Illustrations of the decimal and metric system of all nations.

[2999]

FIELD, R., & SON, *New Street, Birmingham*.—Microscopes, telescopes, and surveying instruments.

[3000]

GUTTA PERCHA COMPANY, 18 *Wharf Road, City Road*.—Submarine telegraph cables.

[3001]

HALL, A. J., 2 *William Street, Clerkenwell*.—Machine for describing ellipses and other oval curves.

[3002]

HALLANA, J. V., 22 *New Street, Spring Gardens*.—Steam expansion gauges.

[3003]

HUSBANDS & CLARKE, *Denmark Street, Bristol*.—Optical instruments.

[3004]

MICROSCOPICAL SOCIETY, *London*.—Peters' machine, for microscopic writing.

[3005]

NICHOLL & FOWLER, 16 *Aldersgate Street, E.C.*—Weighing and measuring apparatus.

[3006]

REGISTRAR GENERAL, *Somerset House*.—Tables calculated and stereographed by the Swedish calculating machine.

[3007]

TENNANT, PROF. J., 149 *Strand, W.C.*—Models of crystals, in glass.

[3008]

TREMLETT, R., 7 *Guildford Place, Clerkenwell*.—Barometers and air-pumps.





CLASS XIV.

PHOTOGRAPHIC APPARATUS AND PHOTOGRAPHY.

[3029]

ADAMS, A., 26 *Bread Street, Aberdeen*.—Carte de visite, stereoscopic views.

[3030]

ALFIERI, C., *Northwood, Hanley, Staffordshire*.—Illustrations of Welsh scenery, &c.; negatives made in field camera.

[3031]

AMATEUR PHOTOGRAPHIC ASSOCIATION, 26 *Haymarket, London*.—Photographs by the members of the Association.

[3032]

ANGEL, O., *High Street, Exeter*.—Photographs, enlarged by the solar camera from collodion negatives.

[3033]

AUSTEN, W., 5 *Buxton Place, Lambeth Road*.—Presses, camera stands, head-dresses, &c.

[3034]

BARNES, R. F., 64A *New Bond Street*.—Photographs.

[3036]

BASSANO, A., 122 *Regent Street, W.*—Coloured crayon, and plain photographic portraits.

[3037]

BEARD, R., 31 *King William Street, London Bridge*.—Coloured and plain photographs and microscopic portraits.

[3039]

BEDFORD, F., 23 *Rochester Road, Camden Road Villas*.—Photographs: landscape and architecture by the wet collodion process.

[3040]

BENNETT, A. W., 5 *Bishopsgate Without, London*.—Photographs: application of photography to illustration of books.

Selection from SEDGFIELD'S ENGLISH CATHEDRAL VIEWS and other scenery for the stereoscope, the scrap-book, and the album—including interiors and exteriors of Beverley, Bristol, Exeter, Winchester, Salisbury, Ely, Norwich, Peterborough, Lincoln, Rochester, Canterbury, and Wells cathedrals, with others.

Price 1s. each for the stereoscope, or 6d. each for the album. The ruined castles and abbeys of Great Britain (21s.).

Specimen of application of Photography to the illustration of books.

[3041]

BIRD, P. H., F.R.C.S., F.L.S., 1 *Norfolk Square, W.*—Photographs of views.

[3042]

BIRNSTINGL, L., & Co., 7 *Coleman Street, E.C.*—Photographs.

[3043]

BLAND & Co., 153 *Fleet Street, London, E.C.*—Photographic cameras, materials, and apparatus.

[3045]

BOOTH, H. C., *Harrogate, Yorkshire.*—Portraits, photographed from life, on paper and ivory, plain and coloured.

[3046]

BOURNE, S., *Moore & Robinson's Bank, Nottingham.*—Photographic landscapes, by the Fothergill dry process.

[3047]

BOURQUIN & Co., 13 *Newman Street, Oxford Street.*—Photographic materials, albums, &c.

The object of BOURQUIN & Co., has always been to manufacture frames suitable to the various kinds of photographic portraits, landscapes, such as passe-partout, gilt frames, fancy frames, fancy cases, show cases, and

mounts; the patent mosaic albums, &c. Specimens of these goods are exhibited. The exhibitors are also manufacturers of albumenized paper.

[3048]

BOWERS, H. T., *Gloucester.*—Photographic views, collodion and wax papers, enlarged copy of ancient print, &c.

Views of Southam de la Bere, the seat of the Earl of Ellenborough; also View of Old Chapel, Southam, which has been in ruins 500 years, and now restored by his Lordship; West Window, Gloucester Cathedral;* Views of Gardens, Alton Towers, &c. (wax paper process);

Portraits, plain and coloured, in oils and water-colours; Portrait of Bishop Hooper, finished in oils upon the photograph, which is enlarged from a small print: a memorial is being erected on the spot where the Bishop suffered martyrdom (near the cathedral) in 1555. Also photographs of fresco paintings in the interior of Higham Church, near Gloucester, executed by T. G. Parry, Esq.

* Memorial of Bishop Monk. Design, "Doctrine of Baptism."

[3049]

BREESE, C. S., *Acock's Green, near Birmingham.*—Instantaneous transparent stereographs on glass.

[3051]

BROTHERS, A., *St. Ann's Square, Manchester.*—Group finished in water colours; portrait on ivory; portraits untouched.

Group of nine figures finished in water-colours.
Portrait of a lady on ivory.

Portraits (untouched) of members of the British Association.

[3052]

BROWNRIGG, S. W., 7 *Eblana Terrace, Dublin.*—Photographs.

[3053]

BULL, J. T. & G., *Great Queen Street, Lincoln's Inn.*—Photographic profiled accessories, and artistic backgrounds.

[3054]

BURNETT, C. J., 21 *Ainslie Place, Edinburgh*.—Photographic prints with uranium, copper, palladium, platinum, &c.

C. BURNETT'S Illustrations of original experimental processes, from British Assciation of 1855, and Royal Scotitish Exhibtion of 1856—7 (and London Exhibition of 1859—60). I. Developments of uranium-prepared papers. 1. By red prussiate of potash (very beautiful red brown print, of March 1855). 2. By yellow prussiate (March 1855). 3 & 4. By nitrate of silver; and 5 & 6 by ammonio-nitrate, with and without gold toning, and with and without iron bath; all of 1855; and fixed in weak am-

monia bath. 7. By gold (1855). 8. Same as No. 1, but toned in acid iron bath (R.S.P. Exhibition 1857). 9. By palladium. 10. Same with gold-toning. 11. By palladium with iron bath. 12. By silver, platinum-soda-toned. II. 1. Dark iron-toned copper print, image being *copper* and iron, with ferrocyanogen (R.S.P. Exhibition, 1857). 2. Manganese print. 3. Actions of light on nitro-prusside of sodium, with and without ferric salts. 4. Silver print, toned in alkaline platinum bath.

[3055]

BURTON, J., & PATESON, R., 28 *Avenham Lane, Preston, Lancashire*.—Landscapes and buildings.

[3056]

CADE, R., 10 *Orwell Place, Ipswich*.—Machinery and architecture illustrated; also views and portraiture.

[3057]

CAMPBELL, D., *Cromwell Place, Ayr*.—Large views: Land of Burns.

[3058]

CAITHNESS, EARL OF, 17 *Hill Street, W.*—Photographic views.

[3060]

CLAUDET, A., 107 *Regent Street*.—Photographic portraits; stereoscopic and visiting-cards, enlarged to the natural size. (See pages 50 & 51.)

[3061]

COLNAGHI, P. & D., SCOTT, & Co., 13 and 14 *Pall Mall East*.—Photographs from ancient and modern pictures, portraits, &c.

[3062]

CONTENCIN, J., 4 *White Cottages, Grosvenor Street, Camberwell*.—Various photographs from drawings, &c.

[3063]

CORDINGLEY, W., 14 *Wells Street, St. Helen's, Ipswich*.—Camera stand.

[3064]

Cox, F. J., 22 *Skinner Street, London*.—Lenses, cameras, portable field apparatus, and instantaneous shutters.

CAMERA SHIELD for producing four carte de visite or sixteen medallion portraits on one plate and with one lens. The dark slide revolves around the axis of the lens, but the plate is always kept vertical, therefore the drainage from flowing back over the surface is prevented.

Specimens taken by the camera shield.

STEREOSCOPIC CAMERA, with three double backs, holding six plates. The weight is 3½lbs.; it requires no unpacking, and has no loose pieces liable to be lost in use.

STEREOSCOPIC CAMERA, fitted with instantaneous shutter affixed to the central diaphragm.

CENTRAL DIAPHRAGM of a lens, showing an instantaneous shutter working without vibration. It can be opened or closed with any degree of rapidity desired.

REFLECTING STEREOSCOPE for pictures four inches square.

Field box containing chemicals for a day's use; it also forms a developing box.

PORTRAIT CAMERA, and lens with swing back.

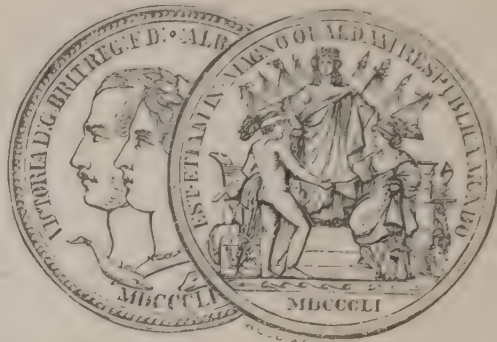
[3065]

CRAMB BROTHERS, *Glasgow*.—Photographs on ivory; views in Palestine; half life-size portraits, not enlarged.

[3066]

CRITCHETT, C., 11 *Woburn Square*.—Photographs.

CLAUDET, A., 107 *Regent Street*.—Photographic portraits; stereoscopic and visiting-cards, enlarged to the natural size.



Mr. Claudet has obtained the following Medals:—

Council Medal, Great Exhibition of London, 1851; First Class Medal, Great Exhibition of Paris, 1855; Silver Medal, Exhibition of Amsterdam, 1855; Bronze Medal, Exhibition of Bruxelles, 1856; Silver Medal, Photographic Exhibition of Scotland, 1860; Silver Medal, Photographic Exhibition of Birmingham, 1861; Society of Arts Medal presented by Prince Albert in 1853, for Mr. Claudet's paper on the stereoscope and its application to photography.

Abstract of an address read the 9th April, 1861, before the Photographic Society of Scotland, by Sir David Brewster, K.H., F.R.S.L. and E., president, in presenting Mr. Claudet with the medal of the Society for the best portrait exhibited at their photographic exhibition of 1861. See '*Journal of the Photographic Society*' for May, 1861, page 181.

"In awarding a medal for the best work of art in a photographic exhibition, it is not often, if it has ever occurred at all, that the successful competitor is distinguished by his discoveries and inventions in the art which he practises.

"These different accomplishments, however, are possessed by Mr. Claudet, to whom the Council have adjudged our silver medal for the best portrait in the Exhibition; and though they were not taken into account, yet I feel it a duty, as well as a privilege, in presenting this medal to Mr. Claudet, to lay before you a brief notice of those discoveries and inventions by which he has achieved the high reputation that he so justly enjoys in the photographic world.

"When an art has arrived at such a degree of perfection, it is a useful as well as an agreeable task to retrace the steps by which it advanced, and to do honour to the men to whom we owe them.

"When Sennebier found that muriate of silver was darkened by light, and became darker in the violet than in the red rays, he made the first step in photography. A German chemist, M. Ritter, advanced another step when he found that the muriate of silver was most powerfully blackened in the invisible rays beyond the violet; but it is to Mr. Thomas Wedgwood that we owe the application of these facts to photographic purposes, but he failed in every attempt to prevent the white parts of his pictures from being blackened by light. The experiments of Wedgwood seem to have been unknown in France, when two ingenious individuals, M. Niépce and M. Daguerre, discovered two entirely different processes of fixing photographic pictures. The result of their joint labours was the daguerreotype, that beautiful art with which we are all acquainted, and which Mr. Claudet has done more than any other individual to bring to its present state of perfection.

"In the time of Daguerre, from 20 to 25 minutes were required to take the photograph of a landscape by this process, and nearly 10 minutes to take a portrait. In this imperfect state of the art Mr. Claudet discovered, and communicated to the Royal Society of London, in 1841, an easy and certain method of accelerating the action of light upon the film of iodine, and thus greatly shortening the process; by this means he obtained in 10 seconds pictures which would have required 4 or 5 minutes by the preparation of Daguerre. So sensitive, indeed, was this new process, that Mr. Claudet was enabled to take portraits by the oxyhydrogen light in 15 or 20 seconds, with an object-glass of short focus. He obtained, also, impressions of black lace by the light of the full moon in 2 minutes, and by the light of the stars

in 15 minutes. He likewise obtained in 4 seconds an image of the moon, in which the shadowed parts were visible. In 15 minutes he obtained the image of an alabaster figure by the light of a candle, and in 5 minutes a similar image from an argand lamp.

"Next in importance to the acceleration of the photographic process, is the perfection of the image which is formed upon the sensitive plate—not of the visible image which is received and seen upon the gray glass, but of the invisible image, which is formed by the photogenic or chemical rays. In studying the subject, Mr. Claudet discovered that the chemical and visual foci were not coincident. He recommended that the rays of the photogenic spectrum should be united in one focus, even at the sacrifice of the achromatism of the lens. 'As the photogenic focus will change its place with the colour and the intensity of the light and with the distance of the object, the photographer should determine experimentally its place in relation to these varying influences.' In order to do this Mr. Claudet invented the *Focimeter*, an instrument 'for finding the difference between the two foci.'

"In the year 1847 Mr. Claudet communicated to the Royal Society an important paper 'On different Properties of Solar Radiation in Photographic operations;' and in 1848 he submitted to the Academy of Sciences, in Paris, his interesting 'Researches on the Theory of the principal Phenomena of Photography in the Daguerreotype Process,' in which he describes a new and ingenious instrument, which he calls a *Photographometer*, from its measuring the intensity of the photogenic rays, and comparing the degree of sensitiveness of various preparations.

"Another instrument of Mr. Claudet's invention is the *Dynactinometer*, for comparing the photogenic power of object-glasses, and measuring the intensity of photogenic light.

"In 1853 Mr. Claudet communicated to the Society of Arts in London a valuable paper 'On the application of the Stereoscope to Photography.' This paper was thought worthy of the Society's Medal, which was presented to him by Prince Albert.

"In a brief sketch like this of the labours of Mr. Claudet, it would be impossible to give an intelligible account of the various improvements which he has made in photography, and of the numerous papers which he communicated to the British Association at eleven of its meetings, between 1849 and 1861, and which have been published in their annual Reports and in other periodical works. There is one of his inventions, however, so remarkable that we cannot pass it by without a special notice.

"In 1857 Mr. Claudet communicated to the Royal Society a paper 'On the Phenomenon of Relief of the Image formed on the Ground Glass of the Camera Obscura;' and in the following year he described a new instrument, called a *Stereomonoscope*, founded on the principles described in that paper, and exhibiting in

CLAUDET, A.—*continued.*

relief a single image consisting of two stereoscopic images combined.

“But while Mr. Claudet has devoted so much of his leisure to the theory of photography, to the improvement of its processes, and the invention of instruments for aiding the photographer in the practice of his art, he has himself produced works of singular beauty, and placed himself at the head of British artists in the department of photographic portraiture. In proof of this we have only to state that the jury of the Great Exhibition of 1851, of which I had the honour to be chairman, awarded to him their Council Medal for the works which he then exhibited, and that the Jury of the Paris Universal Exhibition of 1855 voted to him their medal of the First Class.

“In this brief and imperfect notice of Mr. Claudet’s labours I have referred only to the Daguerreotype process; but while Niepce and Daguerre were privately

engaged in perfecting the art of photography on metal, Mr. Talbot was occupied with the sister art upon paper. These two rival arts long struggled for the pre-eminence; but since the discovery of collodion by Mr. Archer, the Talbotype promises to supersede the Daguerreotype, and to become the true type of the photographic art.

“Though long occupied with the practice of the daguerreotype, Mr. Claudet has pursued the Talbotype with equal success; and it is for one of his portraits, taken upon paper, that the Medal of this Society has been adjudged to him.

“I am sure that the distinguished artists with whose works those of Mr. Claudet have come into competition will not disapprove of the decision of the Council, and will welcome the distinguished stranger, who does the Society honour by his presence, and who has made such valuable contributions to its transactions.”

[3067]

CRUTTENDEN, J., *Week Street, Maidstone.*—Photographs.

[3068]

CUNDALL, DOWNES, & Co., 168 *New Bond Street, and 10 Bedford Place, Kensington.*—Photographs from nature and from drawings.

MESSRS. CUNDALL, DOWNES, & Co., undertake to copy pictures and other works of art, maps, engineering plans and drawings, in any size from 5 in. by 4 in. up to 30 in. by 24 in., and to reproduce photographs and daguerreotypes; they are also prepared to photograph country houses, interiors of mansions, churches, works in progress, &c., and to perform every other description of work of which photography is capable.

Portraits are taken daily on the following terms:—

	£	s.	d.
Portrait (visite) and six copies	0	10	6
Portrait (visite) and twenty copies	1	1	0
Six extra copies	0	6	0
Portrait (visite) and six copies tinted	1	1	0
Portrait (visite) and twelve copies tinted	1	15	0
Portrait (visite) and one copy fully coloured	0	10	6
Portrait (visite) and three copies fully coloured	1	1	0

Terms for larger portraits and for any of the above work can be had on application.

[3069]

DALLMEYER, J. H., 19 *Bloomsbury Street, W.C.*—Photographic lenses, cameras, apparatus, &c.

[3070]

DANCER, J. B., 43 *Cross Street, Manchester.*—Microscopic photographs; landscapes and portraits.

The exhibitor can supply the trade and the public with a variety of minute photographs for the microscope; dissolving-view lanterns, with chromatic lenses, for photographic transparencies, and a variety of photographic

views for the lantern; and also with a new form of the dissolving-view apparatus, for the use of schools. The lanterns with achromatic lenses were originally made by Mr. Dancer for the Manchester Mechanics’ Institute.

[3071]

DAVIS, T. S., 3 *Stanley Terrace, Stockwell, S.*—Photographic manipulating camera.

[3072]

DOLAMORE & BULLOCK, 30 *Regent Street, Waterloo Place, S.W.*—Photographs.

ARCHITECTURAL AND LANDSCAPE PHOTOGRAPHY. Engineering and other works in progress.

“The Blind Beggar,” from Dyckman’s picture in the National Gallery.

“Early Flowers,” a companion, from the original, by W. Maw Egley.

Price 10s. 6d. each.

[3073]

EASTHAM, J., 22 *St. Anne’s Square, Manchester.*—French and English Treaty of Commerce, opal portraits.

[3074]

FENTON, R., 2 *Albert Terrace.*—Photographs.

[3075]

FIELD, J., *Dornden, Tonbridge Wells.*—Specimens of photolithography; plates engraved on stone by the sun.

[3077]

GANDY, T., 40 *South Street, Grosvenor Square*.—Portraits.

[3078]

GORDON, R. M., 38 *Alpha Road, St. John's Wood*.—Photographs of Madeira.

[3079]

GORDON, R., *Bembridge, Isle of Wight*.—Isle of Wight scenery.

[3080]

GRAHAM, J., *Surrey Lodge, Lambeth*.—Photographic panoramic views of Jerusalem, Syria, Naples, and Pompeii.

[3081]

GREEN, B. R., 41 *Fitzroy Square*.—Coloured photographs.

[3083]

GRISDALE, J. E., 73 *Oxford Street, W.*—Photographic camera.

[3084]

GUSH & FERGUSON, 179 *Regent Street*.—Photographic miniatures, collodion process.

[3085]

HAMILTON, A. R., *Maple Road, Surbiton, S.W.*—Photographs of the Waterloo medal, by B. Pistrucci.

[3086]

HARE, G., 140 *Pentonville Road, N.*—Photographic portrait, landscape, stereoscopic, and carte de visite cameras.

Portrait and Landscape, Stereoscopic, Carte de visite, | best possible manner, and with all the latest improve-
and every other form of camera are made to order in the | ments, by the exhibitor.

[3087]

HARMER, R., 131 *Shoreditch*.—Photographs illustrating a new method of printing, adapted for book illustration.

[3088]

HART, F. W., 13 *Newman Street, Oxford Street, London*.—Life-size photograph by exhibitor's apparatus.

The following are exhibited :—

Photograph, enlarged, by F. W. Hart's Patent Instruments, complete, with lens and dark chamber, from 8*l.* 10*s.* to 25*l.*

Also F. W. Hart's Patented Printing Frames for light and shade backgrounds: from 1*l.* 1*s.* to 2*l.* 2*s.*

Exhibited on Messrs. Bourquin & Co.'s stand. Class 14.

[3090]

HEATH & BEAU, 283 *Regent Street, W.*—Miniatures and photographs.

[3091]

HEATH, VERNON, 43 *Piccadilly*.—Various portraits, English and Scottish landscapes.

[3092]

HEMPHILL, W. D., M.D., *Clonmel*.—Photographs of antiquities, &c., at Cashel and Cahir, Co. Tipperary, Ireland.

[3093]

HENNAH, T. H., 108 *King's Road, Brighton*.—Collodion photographs.

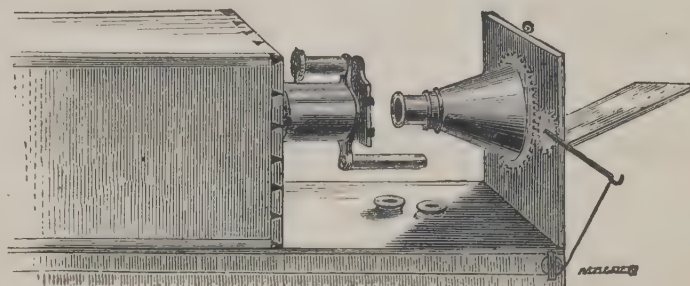
[3094]

HERING, H., 137 *Regent Street, London*.—Frames of plain and coloured photographs, portraits and views.

[3095]

HIGHLEY, SAMUEL, Philosophical Instrument Maker, and Private Teacher of Photography, &c., 70 *Dean Street, Soho, London, W.*—Photographic apparatus.

Operators' actinometer, for ascertaining the amount of exposure necessary at a given time, with any light, by any lens and process. A photo-micrographic camera, with appliances for taking photographs of mounted or living microscopic objects. Photographers' travelling lamp. Highley's dropping bottle for nitrate of silver solution. Improved pneumatic plate-holder. Levelling stand. Operating room camera stand. Photo-micrographs, and photographs of scientific and artistic subjects for the magic lantern. Books illustrated by photography.



[3096]

HILL, D. O., *Edinburgh*.—Photographs.

[3097]

HOCKIN & WILSON, 38 *Duke Street, Manchester Square, W.*—Photographic set, and tent; collodion, &c., in hermetically sealed tubes.

[3098]

HOLDEN, REV. DR., *Durham*.—Photographs of cathedrals and abbeys.

[3099]

HOPKIN & WILLIAMS, 5 *New Cavendish Street*.—Photographic chemicals.

[3100]

HORNE & THORNETHWAITE, 123 *Newgate Street*.—Photographic lenses, cameras, apparatus, and chemicals.

[3101]

JAMES, COLONEL SIR H., R.E., *Ordnance Survey Office, Southampton*.—Plans reduced by photography, photozincographs, and photopapyrographs.

[3102]

JEFFREY, W., 114 *Great Russell Street, Bloomsbury, W.C.*—Photographs from busts of Alfred Tennyson, William Fairbairn, &c.

[3103]

JEFFERY, W. (SHEPHERD & Co.), 97 *Farringdon Street, E.C.*—Photographic tent, 14 lbs. weight.

[3104]

JONES, B., *Selkirk Villa, Cheltenham*.—Photographic pictures from glass negatives.

[3105]

JOUBERT, F., 36 *Porchester Terrace, W.*—Photographs in vitrifiable colour, burnt in on glass; collodion photographs, and phototypes.

[3106]

KATER, E., 46 *Sussex Gardens, Hyde Park*.—Ancient armour from Mr. Meyrick's collection.

[3107]

KEENE, R., *All Saints, Derby*.—Photographs illustrating scenery and antiquities of Derbyshire.

[3108]

KILBURN, W. E., 222 *Regent Street*.—Photographic portraits.

[3109]

KING, H. N., 42½ *Milsom Street, Bath*.—Cartes de visite; portraits of celebrities; views and stereoscopic slides.

Duplicates of the large portraits of celebrities, "Carte de Visite," and stereoscope slides exhibited by Mr. H. N. King, may be had, post free, from the Exhibitor, or from Mr. Poulton, 352 Strand, London.

[3110]

LAMB, J., 191 *George Street, Aberdeen*.—Views or portraits, or both.

[3111]

LEAKE, J. C., *Poplar, London*.—Photographic operating tent.

[3113]

LICKLEY, A., *Allhallowgate, Ripon, Yorkshire*.—Camera, with shade and shutter; positive collodion photographs.

[3115]

LOCK & WHITFIELD, 178 *Regent Street*.—Photographic miniatures.

This collection of miniatures includes portraits of the Countess Spencer, Viscountess Clifden, Lady Raglan, Lady Burghley, Duke of Sutherland, Earl of Malmesbury, Earl of Harewood, Earl Strathmore, Lord Burghley, Lord Dunkellin, Lord Colville, &c., &c.

These portraits are painted in water-colours (and not in oil or any other opaque medium), thus retaining all the correct drawing and delicacy of modelling which a good photograph possesses, combined with the transparency and finish of the best ivory miniatures.

[3116]

LONDON SCHOOL OF PHOTOGRAPHY, 103 *Newgate Street*.—The collodion knapsack, for out-door photography; illustrations of the applications of photography.

[3117]

LONDON STEREOSCOPIC COMPANY, 54 *Cheapside, E.C.*—Instantaneous stereoscopic views, large views, and portraits.

[3118]

MACDONALD, SIR A. K., BART., *Woolmer, Liphook, Hants*.—Photographic views.

[3119]

MACKENZIE, W., *Paternoster Row*.—Photographic illustrations for the Queen's Bible, by Frith.

A specimen of this superb edition of the Scriptures is exhibited in Class 28. One hundred and seventy copies only will be printed. The list of subscribers will be printed in the order received.

[3120]

M'LEAN, MELHUSH, & HAES, 26 *Haymarket*.—Photographic apparatus. (See page 55.)

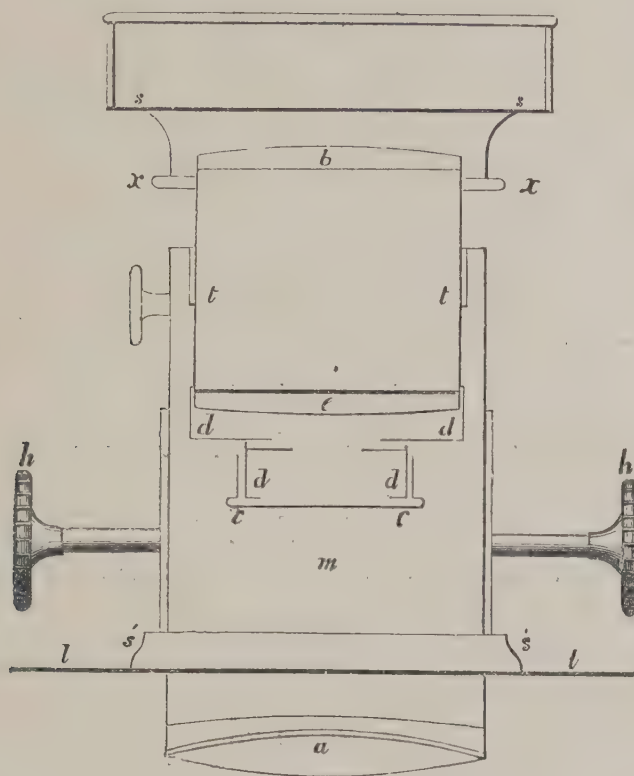
[3121]

MARRIOTT, M., *Montpelier Square, London, S.W.*—Panoramic camera; portable stereoscopic cameras for dry processes.

[3122]

MAULL & POLYBLANK, 187A *Piccadilly*.—Photographs.

M'LEAN, MELHUISE, & HAES, 26 Haymarket.—Photographic apparatus; untouched and coloured photographs; universal objectives; the simultaneous camera, and highly-finished photographic miniatures.



OPINIONS OF THE PRESS.

[Reprinted from "THE PHOTOGRAPHIC NEWS," July 13th 1860.]

These lenses have been constructed by a photographer of long practical experience, with the view of obviating the inconveniences presented by other lenses, and supplying their deficiencies. They aim at universal applicability; and it is believed that this desirable result is obtained by the peculiar construction and arrangement adopted. In the various combinations, each affords a picture equally well defined, from the centre to the margin, without any other advantages whatever being sacrificed. These results are obtained without any increase of complexity: there are no extra portions to add to the necessary incumbrances of the photographer's baggage, or to perplex and baffle him by their loss. The greatest possible simplicity, combined with universal applicability to the various requirements of the photographer, both in portraiture and landscape, were sought by the inventor in these combinations, and it is hoped they have been successfully attained.

Description.—The front lens, *b*, is of the ordinary size, but the back lens, *a*, is one size larger, thus enabling the operator to throw an equal body of light over the entire surface of the plate, and to take in a larger angle.

The diaphragm may be changed without the trouble of unscrewing any portion of the arrangement, by merely withdrawing the tube, *t*, thus the disadvantage attendant upon the cut in the middle of the brass mounting, as in Waterhouse's stop, is avoided.

The lens has a double pinion to the rack, *h, h*, so that either hand may be employed in focussing.

The whole may be packed as compactly and in as small a compass as other compound objectives, as shown in the above diagram.

Combination 1.—The same as shown in the figure, only with the diaphragm portion of cap, *d, c*, removed. It forms a portrait lens of short focus, and with the diaphragm, *d*, *in situ*, is suited for enlarging and copying.

Combination 2.—As a portrait lens, adapted for pictures up to $6\frac{1}{2}$ by $4\frac{3}{4}$. It is produced by removing *c d*, and extra lens *e*.

Combination 3.—Is a portrait lens, of long focus, obtained by unscrewing the shade from *x x*, and unscrewing the whole of the brass mounting from the flange *l l*, then turning it round, and screwing *x x* into the flange *l l*. The lens *a* is removed, and the shade screwed at *s' s'*. Will take a portrait $8\frac{1}{2}$ by $6\frac{1}{2}$.

Combination 4.—Is a landscape lens, obtained by unscrewing the shade from *x*, and the brass mounting from the flange *l*. Then withdraw the tube *t t* from the mounting *m*, and remove the extra lens *e*, but retaining the diaphragm *d*, and the small cap *c*. Screw *x x* into the flange *l l*. Yields a picture up to 10 by 8.

[Reprinted from "THE PHOTOGRAPHIC NEWS," July 20th, 1860.]

IN our notice of Mr. Melhuish's new lenses, of last week, we omitted to mention that the lens described was the $\frac{1}{2}$ -plate size; and also to add that Combination 3 has great depth of focus, and is admirably suited for interiors.

[3123]

MAYALL, J. E., 226 *Regent Street*.—Portraits of eminent personages, studies from life; a crayon machine and daguerreotypes.

[3124]

MAYER BROTHERS, 133 *Regent Street*.—Photographic portraits.

The price of the ALBUM PORTRAITS is one guinea for twenty-five copies. Extra copies ordered at the same time are charged 1s. each. No fresh order will be executed for fewer than twelve.

every size, plain and coloured. They have every facility for taking groups—such as schools, corporations, &c. At their Brompton establishment they have photographic rooms on the ground-floor.

MESSRS. MAYER execute photographic portraits of

[3125]

MAYLAND, W., *Cambridge*.—Views of the University and its vicinity.

[3126]

MOENS, W. J. C., *Lewisham*.—Views of water supply of ancient Carthage; temples in Greece, and others.

[3127]

MUDD, J., 10 *St. Ann's Square, Manchester*.—Landscape photographs.

[3128]

MURRAY & HEATH, 43 *Piccadilly*.—Cameras, tent, and apparatus.

[3129]

NEGRETTI & ZAMBRA, *Hatton Garden*.—Transparent glass pictures.

[3130]

NEWCOMBE, C. T., 135 *Fenchurch Street, E.C.*—Photographs.

[3131]

NICHOLSON, A., 23 *St. Augustine Road, Camden Town*.—Photographs from plates prepared by Fothergill's process.

[3132]

OLLEY, W. H., 2 *Bolingbroke Terrace, Stoke Newington*.—Photographs from the microscope, by reflecting process.

[3133]

OTTEWILL, T., & Co., *Charlotte Terrace, Islington*.—Photographic apparatus.

[3134]

PENNY, G. S., 14 *Rodney Terrace, Cheltenham*.—Photographs by various processes.

[3135]

PIPER, J. D., *Ipswich*.—Landscapes, &c., by collodion process.

[3136]

PONTING, T. C., 32 *High Street, Bristol*.—Photographs enlarged from small negatives; iodized negative collodion, sensitive for years.

[3138]

POULTON, S., 352 *Strand, W.C.*—Stereoscopic slides. Photographs, untouched and coloured.

[3139]

POUNCY, J., *Dorchester, Dorset*.—Photographs printed in carbon.

[3140]

PRETSCH, P., 3 *Guildford Place, Fountling*.—Printed plates and blocks, produced by photography and electrotpe only; photographic engraving and printing with ordinary printers' ink.

[3141]

PROUT, V., 15 *Baker Street, Portman Square*.—Reproductions of pictures—various subjects.

[3142]

PYNE, J. B., Jun., 40 *Roxburgh Terrace, Haverstock Hill, N.W.*—Photographic copies of pictures, sculpture, portraits from life, &c.

[3143]

RAMAGE, J., *Edinburgh*.—Specimens of photolithography.

[3144]

REEVES, A., 257 *Tottenham Court Road, London*.—Microscopic photographs and microscope.

[3145]

REJLANDER, O. G., 42 *Darlington Street, Wolverhampton*.—Various photographs.

[3146]

RICHARDSON, T. W., *Brede, Sussex, and Staplehurst*.—A reflecting camera.

[3147]

ROBINSON, H. P., 15 *Upper Parade, Leamington*.—Photographs.

[*Obtained the Silver Medal of the Photographic Society of Scotland, 1860; the Special Medal of the same Society, 1861; a Silver Medal of the Royal Cornwall Polytechnic Society, 1861; a Medal of the Birmingham Photographic Society, 1861; and Honourable Mention of the Belgium Industrial Exhibition, 1861.*]

A Holiday in the Woods.

The Lady of Shalott (*vide* Tennyson).

Fading away.

The Top of the Hill.

"Here they come!"

Early Spring.

Elaine with the Shield of Lancelot.

Little Red Riding Hood and the Wolf.

"She never told her love."

Album Studies.

[3148]

ROSS & THOMSON, 90 *Princes Street, Edinburgh*.—Photographs by the collodion process.

[3149]

ROSS, T. (only son and successor to the late Andrew Ross), Manufacturer of optical instruments, 2 and 3 *Featherstone Buildings, Holborn*.—Photographic lenses, cameras, stands, and apparatus. (*See pages 58 & 59.*)

[3150]

ROUCH, W. W. (formerly Burfield & Rouch), 180 *Strand*.—Apparatus and chemicals; photographs, taken with new binocular camera and Hardwich's bromo-iodized collodion. (*See page 60.*)

[3151]

RUSSELL, J., *East Street, Chichester*.—Ruins of Chichester Cathedral after the fall of the spire.

[3152]

SHEPHERD & Co., 97 *Farringdon Street*.—Cameras, lenses, &c.

The Portrait Lenses combine great rapidity with extreme uniformity of sharpness over the whole field, and are therefore particularly adapted for instantaneous pictures (the leading feature in the photographic art).—Price from 1*l.* 1*s.* to 20*l.*

The Landscape Lenses are remarkable for giving flatness of field and straight marginal lines, as well as rapidity of action. Price from 12*s.* to 12*l.*

Besides superiority of quality, they are the cheapest lenses in the market.

[3153]

SIDEBOTTOM, J., 19 *George Street, Manchester*.—Photographic landscapes, by the collodio-albumen process.

[3154]

SIMPSON, H., 1 *Saville Place, Lambeth*.—Photographic cabinets, forming complete operating rooms.

The PHOTOGRAPHIC CABINET when extended forms a complete operating room. When closed it has the appearance of an ordinary closet or wardrobe, and will contain all chemicals, cameras, portable tent, and other apparatus, thus avoiding all photographic litter. It can be extended in one minute, and will then form a dark chamber about four feet square, fitted with sink, drawers, and other conveniences. The sink, drawers, &c., shift, so that light may be admitted from left or right. White light can be admitted at pleasure. There is no combus-

tion inside chamber, and abundant ventilation without draught. No dust can arise from curtains, as they are entirely superseded by india-rubber springs.

For convenience of carriage it may be constructed in parts and fitted with screws, and carefully marked, so that with the printed directions any intelligent youth may put it together. It may be had painted or unpainted, so that it may be coloured the same as the staircase or furniture. Price, unpainted, 6*l.* 10*s.*; painted, 8*l.* 10*s.*

Various modifications of the above from 3*l.* to 3*l.* 15*s.*

Ross, T. (only son and successor to the late Andrew Ross), Manufacturer of optical instruments, 2 and 3 *Featherstone Buildings, Holborn*.—Photographic lenses, cameras, stands, and apparatus. (*See also CLASS XIII.*)

PANORAMIC LENSES and apparatus for pictures, including an angle of upwards of 100°. (*For the angular extent of pictures taken by the panoramic and the ordinary Landscape Lenses respectively, see illustrations.*)

	£	s.	d.
Panoramic Lens for pictures $10\frac{1}{2} \times 5$; camera with screw adjustment, plate- holder, and screen; printing press; gutta percha bath and dipper; frames for hold- ing glass while cleaning; box for one dozen curved glasses, and tripod stand, in varnished pine case	22	0	0
Panoramic Lens for pictures, for $14 \times 6\frac{1}{2}$, with apparatus complete	28	0	0
Ditto, ditto, for 17×8 , with apparatus com- plete	38	0	0
Stereoscopic and other sizes.			

LENSES.

Portrait lenses, with No. 1 and No. 2 back combinations.

Portrait lenses of extra large apertures for producing pictures of children and animals in dull weather.

Cartes de visite Lenses, adapted for operating rooms of any length.

Cartes de visite Lenses, extra quick acting.

Single combination landscape lenses, of the very best construction.

Petzval's orthographic lenses, for groups, views, and architectural subjects.

Triplet lenses, for views, architecture, and copying, giving straight marginal lines and absolute flatness of field.

Stereographic portrait, landscape, orthographic, and triplet lenses.

Focussing eye-piece, for observing the image on the grayed glass screen.



VIEW IN JERSEY.—TAKEN WITH PANORAMIC LENS, 5 INCHES FOCUS.

Ross, T.—*continued.*



VIEW IN JERSEY.—TAKEN WITH ORDINARY LENS, 5 INCHES FOCUS.

CAMERAS.

Square mahogany sliding trunk cameras.

Ditto, ditto, with swing backs, screw and rack adjustments, &c.

Plain folding cameras.

Folding and sliding trunk cameras.

Ditto, ditto, with screw adjustment.

Improved Kinnear's portable camera.

Universal portable bellows camera, with swing back and screw adjustment, on tripod stand.

Binocular and multiple cameras, of various constructions, with rising fronts, rising and dividing fronts, swing backs, screw and rack adjustments, and instantaneous shutters for stereoscopic and cartes de visite pictures.

Latimer Clarke's stereoscopic camera.

Photographic apparatus, cases of chemicals, &c.



PANORAMIC LENS AND
APPARATUS FOR PICTURES
INCLUDING AN ANGLE
OF UPWARDS OF 100°.

ROUCH, W. W. (late Burfield & Rouch), 180 *Strand, London*.—Apparatus and chemicals; photographs, taken with new binocular camera and Hardwich's bromo-iodized collodion.

From the earliest days of photographic art, the attention of this firm has been directed to the study of the various appliances required for its practice. They have introduced many of the most important improvements in apparatus, and have earned a well-merited celebrity for chemical preparations, which are unsurpassed by those of any other maker. The whole of their instruments are manufactured on their own premises, by their own workmen, and under the immediate superintendence of Mr. Rouch. They are constructed with mathematical precision, and the materials employed are the best procurable, and are carefully selected to withstand the effects of change of temperature and climate. These conditions are not made a pretext for excessive charges, as is frequently the case. The prices affixed to all their goods are strictly moderate, and as low as is compatible with first-class workmanship and material. The best proof that can be given of these statements is the well-known fact, that they have supplied many of the most important sets of apparatus yet constructed; that their apparatus has been sent to nearly every part of the world; and that in no instance has complaint of bad construction ever reached them.



Edwards's Registered New Model Tent, a new and admirably contrived dark tent, moderate in price, and far superior to any other substitute for a dark room. Manufactured only by W. W. Rouch, 180 Strand, London. By means of this admirable contrivance, the trouble of working the wet collodion process is greatly reduced,—in fact many of the dry processes involve far more trouble, and it is well known that the result is greatly inferior. See descriptions affixed to tent.

Rouch's New Universal Camera is by far the most suitable camera for hot climates. During the past two years this instrument has been supplied to most of our best photographers, as well as to the various Government Departments, and is acknowledged to be the lightest, firmest, and most portable camera yet devised. It can be made of any size. The same camera can be used for either short-focus portrait or long-focus landscape lenses. It is fitted with a most excellent screw adjustment, thus rendering rack and pinion to lens unnecessary, and possesses all the advantages of a swing back.

Rouch's Model "Carte de Visite" Camera.—In proof of the superiority of the model "Carte de Visite" and stereoscopic camera, it may be stated that, although only recently introduced, it is at the present time in daily use at the leading metropolitan ateliers. It is fitted with a

perfect rack-work adjustment, and possesses a range of focus from $3\frac{1}{2}$ inches to 7 inches. The dark slide and focusing screen have each new and special advantages, the latter being permanently attached to the camera, so that it is always in its place, and cannot be mislaid or broken.

Photographic Lenses.—W. W. Rouch is the appointed agent for the most celebrated lens makers, including Ross, Dallmeyer, and Grubb, whose productions are known to possess separate and distinct advantages. Having a most intimate knowledge of the same, he will always take care to select only such as will best fulfil the requirements specified. French lenses (advertised by many as "own manufacture") at Parisian prices.

Rouch's New Registered Parallel Instantaneous Shutter and Sun Shade is acknowledged to be the only really efficient arrangement for taking children, animals, waves, &c.

Rouch's Model Operating Room Stand may be regarded as an essential requisite in every studio.

W. W. Rouch is manufacturing largely the New Binocular Camera, with movable central partition, which combines in one instrument, at a moderate cost, all the advantages of a landscape, portrait, "carte de visite," and stereoscopic camera, and producing the most charming panoramic landscapes, 12 specimens of which may be seen on the screen next the staircase, No. 263 in the Catalogue, or one can be obtained by post, with particulars of exposure, collodion, and development, on receipt of 2s. 8d. in postage-stamps. Size of picture, $7\frac{1}{4}$ by $4\frac{1}{4}$, mounted on plate, India-tinted paper. Every photographer ought to possess one of these instruments.

The following are some of the important manufactures of W. W. Rouch. None are genuine unless stamped with red label and trade mark:—

Negative collodion, with usual iodizer.

Negative collodion, with cadmium iodizer.

Negative collodion, with bromo-iodizer.

This collodion remains unchanged for a lengthened period, and with an iron developer produces the most exquisite results.

Collodion for the Fothergill, tannin, and other dry processes.

New extra-sensitive keeping collodion, prepared especially for portraiture and instantaneous photography, retains its sensitiveness, and is considerably improved by age. Formerly prepared by Mr. Hardwich, late Lecturer on Photography, King's College, London, and Author of "Photographic Chemistry," &c.

The laboratory, lately occupied by Mr. Hardwich, and fitted with the most complete appliances, is now occupied by Mr. Rouch, and devoted exclusively to their manufacture. Every sample is tested, and the utmost care is taken to secure perfect uniformity. Every bottle is accompanied with a new and comprehensive paper of directions.

The uniform character, persistence, and absolute purity of these collodions, their greatly increased employment by a very large number of our first professional and amateur photographers, justify the assertion that they cannot be surpassed; and that, whether for use in this country or abroad, they will be found to possess, in their various combinations, a universal applicability for any of the wet or dry processes.

The Collodion Committee, numerous correspondents at home, on the Continent, in India, China, Australia, North and South America, Egypt, &c., &c., bear ample testimony as to their excellent working qualities under the most trying variations of temperature and climate.

Burfield and Rouch have paid great attention to the export branch of their business, and having adopted an improved method of packing, they can conscientiously recommend their preparations to architects, engineers, officers, tourists, and shippers, as safe articles for transmission abroad. Mr. Rouch will be happy to advise as to the most suitable iodizer for certain climates.

Price List of chemicals etc. forwarded on application. A liberal discount to shippers, etc.



[3155]

SKAIFE, T., 47 *Baker Street, W.*—Pistolgraph, with a selection of its productions called pistolgrams.

SKAIFE'S PATENT PISTOLGRAPH (price ten guineas), with a selection of its jewel productions, including babies from the day of birth, and album reproductions on paper, plain and coloured. A prospectus will be sent on

receipt of stamped address, or a copy of Illustrated Guide (second edition) to the Pistolgraph will be forwarded on receipt of thirteen stamps.

[3156]

SMITH, L., *Cookridge Street, Leeds.*—Photographic views.

[3157]

SMYTH & BLANCHARD, *George Street, Euston Square.*—Instantaneous photographs and life-size photographs.

[3158]

SOLOMON, J., 22 *Red Lion Square.*—Photographic apparatus, &c.

[3160]

SPACKMAN, B. L., *Kensington Museum.*—Photographs of the gardens of Horticultural Society; various art reproductions; Exhibition building.

[3161]

SPENCER, J. A., 7 *Gold Hawk Terrace, Shepherd's Bush, W.*—Albumenized and other prepared photographic papers.

The articles here exhibited will possess little or no attraction for the general visitor, and will be viewed with interest only by those who are engaged in the practice of photography.

It may, however, be interesting to observe, that it is one of the productions the demand for which has arisen entirely since the former Exhibition of 1851. At that time photography was quite in its infancy, and few or no pictures were exhibited that could compare with those met with at this moment at every turn. Photographs were then obtained generally from "paper" negatives, with the exception of a few from "albumen on glass;" collodion, which is now so generally employed, only having been discovered during the time of that Exhibition, of course had not been brought to the perfection it now possesses.

The proofs from the negatives thus obtained were exclusively obtained upon what is now called "salted paper," being merely good writing-paper, saturated with a dilute solution of a soluble chloride, or brushed on one side with a stronger solution of a similar salt.

A year or two after, one of the leading French photographers, observing the universal want of sharpness upon these papers, suggested and made use of papers,

the salting solution of which contained various proportions of albumen, the action of which was to keep the material employed in the production of the image upon the surface of the paper, instead of, as heretofore, partly penetrating into its substance, thereby insuring a sharpness and brilliancy in the proof that had not been before attainable. Recently, the enormous demand for the well-known "stereoscopic slides," and later still, of "carte de visite" or "album pictures," in which excessive sharpness is necessary, has made it requisite to increase the quantity of albumen in the preparation of the paper, till now, when pure albumen, without any dilution, is very extensively employed.

When this method of preparing paper was first employed, every photographer probably prepared paper for his own use; but experience proved, in this case as in all similar ones, division of labour to be most economical. Now, the preparation of photographic paper with salted albumen has become, in many hands, a business of itself; and some idea of the quantity used may be found in the statement, that in one establishment alone (that in which the samples exhibited were prepared) upwards of 200,000 eggs have been employed in the course of six months to furnish the requisite quantity of albumen.

[3162]

SPODE, J., *Hawkesyard Park, near Rugeley.*—Proofs from collodion negatives.

[3163]

STOVIN & Co., *Whitehead's Grove, Chelsea.*—Principal buildings, London.

[3164]

STUART WORTLEY, LIEUTENANT-COLONEL A. H. P., *Carlton Club, Pall Mall.*—Photographs of Vesuvius, during the eruption of 1861-2.

[3165]

SUTTON, E., 201 *Regent Street, W.*—Miniature photographs, plain and coloured.

[3166]

SWAN, H., 5 *Bishopsgate Without, London.*—Large (and apparently single) pictures rendered stereoscopic; new stereoscopes.

PATENT STEREOSCOPIC COMBINATIONS :—

No. 1. LARGE RECEDING PICTURE, which falls into perfect stereoscopic relief on bringing the right eye in front of the small view-glass, while both eyes are still kept open. Price 21s.

No. 2. THE CLAIRVOYANT STEREOSCOPE. "This instrument has the following advantages over those in common use: it suits equally for examining opaques and trans-

parencies, paper and glass impressions; it can be used to cover plates bound in books; it adapts itself to all angles of sight and focal lengths; it is easy to hold in the hand, and admits the light with perfect freedom; it is pretty, compact, and can be put away out of sight."—*Athenæum.* Price, from 10s. 6d.

No. 3. STEREOSCOPIC SHRINE, an unpublished mode of obtaining a stereoscopic image visible from a distance as well as near.

[3167]

TALBOT, W. H. FOX, *Lacock Abbey, Wiltshire.*—Photoglyphic engravings, produced by the action of light alone.

[3168]

TELFER, W., 194 *Regent Street.*—Untouched and coloured photographs.

[3169]

THOMPSON, C. THURSTON, *South Kensington Museum.*—Photographs from the Raphael cartoons, and pictures by J. M. W. Turner.

[3170]

THOMPSON, S., 20 *Portland Road, Notting Hill, W.*—Photographs, landscapes, architectural subjects, and reproductions.

[3171]

TRAER, J. R., F.R.C.S., 47 *Hans Place, S.W.*—Photographs of microscopic objects.

[3172]

TURNER, B. B., *Haymarket.*—Photographs from paper, negatives taken by the Talbot process.

[3173]

VERSCHOYLE, LIEUT.-COLONEL, 23 *Chapel Street, Belgrave Square.*—Photographs, by wet and collodion albumen processes.

[3174]

WALKER, C., & SON, *Windsor Road, Lower Norwood.*—Carbotype photographs, unchangeable; silver printed duplicates, changeable.

[3175]

WARDLEY, G., 10 *St. Ann's Square, Manchester.*—Photographic landscapes: negatives produced by the Taupenot process.

[3176]

WARNER, W. H., *Ross, Herefordshire.*—Architectural and miscellaneous photographs from enlarged negatives.

Architectural and other photographs from enlarged negatives.

These pictures were enlarged during the month of February, 1862, from negatives of the dimensions of 3¼ by

2¾ inches. Process, wet collodion. Lens by Ross. Average exposure, four minutes. Diaphragm, eighth of an inch. For terms apply (with stamp enclosed) to the exhibitor.

[3177]

WATKINS, H., 215 *Regent Street.*—Photographic portraits.

[3178]

WATKINS, J. & C., 34 *Parliament Street, S.W.*—Portraits, plain and coloured.

[3179]

WHITE, H., 7 *Southampton Street, Bloomsbury*.—Photographic landscapes.

[3180]

WHITING, W., & SONS, *Camden Town*.—Portable developing cameras for working wet collodion in the open air.

[3181]

WILDING, W. H., 2 *Chesterfield Street, King's Cross*.—Universal eccentric camera front; instantaneous camera.

[3182]

WILLIAMS, T. R., 236 *Regent Street, W.*—Untouched and coloured photographic portraits, vignettes, cartes de visite, &c.

[3183]

WILSON, G. W., *Aberdeen*.—Views by the wet collodion process.

[3184]

WILSON, SIR T. M., *Charlton House*.—The Geysers, Iceland.

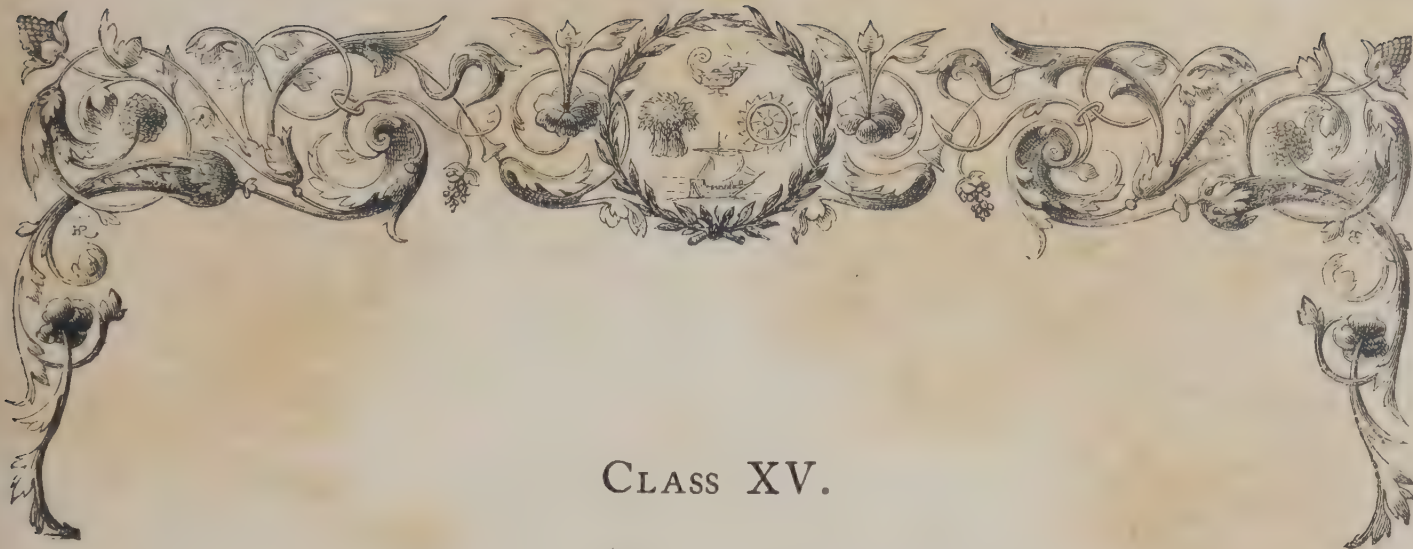
[3186]

WRIGHT, C., 235 *High Holborn*.—Photographic portraits and copies of paintings.

[3187]

WRIGHT, DR. H. G., *London*.—Portable photographic apparatus, including tent, &c.





CLASS XV.

HOROLOGICAL INSTRUMENTS.

[3218]

ADAMS, F. B., & SONS, 21 *St. John's Square, London*.—Patent reversible chronometer; duplex and lever watches.

[3219]

AGAR, WILLIAM, *Bury, Lancashire*.—Specimens of working men's watches and independent centre seconds, manufactured in Bury.

[3220]

ARMSTRONG, THOMAS, Inventor and Manufacturer, *Manchester*. — Armstrong's improved watchman's detector clocks, steam or speed clock, &c.

The following are exhibited:—

	£ s. d.		£ s. d.
ARMSTRONG'S IMPROVED WATCHMAN'S CLOCK is an ordinary office Timepiece and Watchman's clock combined, for indicating punctuality and registering the neglect of it. It is entirely self-acting, portable, simple in construction, and requires little attention. Price, in plain mahogany case, dial 14 inches diameter	4 15 0	ARMSTRONG'S IMPROVED WATCHMAN'S CLOCK, same as the above, but in a more highly ornamented case, dial 12 inches diameter .	5 10 0
		ARMSTRONG'S IMPROVED STEAM OR SPEED CLOCK indicates the amount of work done in all establishments where steam-power is used. It also compels the engineer to work at the required pressure, by indicating any neglect. In mahogany case complete, for fixing .	2 15 0

[3221]

AUBERT & LINTON, 252 *Regent Street*.—Watches with recent improvements; ornamental clocks for the table and mantelpiece.

[3222]

BAILEY, JOHN, & Co., *Albion Works, Manchester*.—Improved turret clock in tower, suitable for a market-place, &c.

[3223]

BARRAUD & LUND, 41 *Cornhill, London*.—Chronometers and watches.

[3224]

BAYLISS, WILLIAM, *Finnere, Oxfordshire*.—Model of new remontoire escapement, as put up in Finnere church clock.

[3225]

BENNETT, JOHN, F.R.A.S., 64 & 65 *Cheapside, and 62 Cornhill*.—Marine and pocket chronometers; public and private clocks; every description of gold and silver watches.

[3226]

BENSON, J. W., *Ludgate Hill*.—Gold and silver watches and clocks, highest quality, magnificently decorated with artistic designs.

[3227]

BLACKIE, GEORGE, 24 *Amwell Street, E.C.*—A new compound balance to correct the errors in chronometers, and new auxiliary to balance.

[3228]

BROCK, JAMES, 21 *George Street, Portman Square*.—Marine chronometers.

[3229]

BROOKS, S. A., *Northampton Square, London, E.C.*—Watch jewels; sets of jewel gauges for watchmakers and material dealers.—(See page 67.)

[3230]

CAMERER, KUSS, & Co., 2 *Broad Street, Bloomsbury*.—1. A three-part quarter skeleton on ten bells. 2. A trumpeter clock. 3. A cuckoo clock.

[3231]

CAMPBELL, ANDREW, 63 *Cheapside, E.C.*, and 43 *Tottenham Court Road*.—A selection of gold and silver watches.

[3232]

CHEVALIER, BENJAMIN, 4 *Red Lion Street, Clerkenwell, E.C.*—Chronometer and watch cases.

[3233]

CLARK, DR., *Finnere House, Oxfordshire*.—Astronomical clock, impelled by gravitation, requires no oil to the escapement.

[3234]

COATHUPE, CAPTAIN H. B., 1 *Abingdon Street, Kensington*.—Everlasting shilling “silent clocks;” painting-engraving; printing-embossing; printing-painting.

[3235]

COLE, JAMES FERGUSON, 5 *Queen Square, Bloomsbury*.—Chronometers, watches, tempered springs; new horological models and descriptive treatise.

[3236]

COLE, THOMAS, 6 *Castle Street, Holborn*.—Ornamental and portable clocks of original construction and design.

[3237]

CONDLIFF, JAMES, 4 *Fraser Street, Liverpool*.—A skeleton clock.

[3238]

COOKE, THOMAS, & SONS, *Buckingham Works, York*.—Church and turret clock, astronomical clocks, and time regulators.

[3239]

CRISP, W. B., 81 *St. John Street Road*.—Chronometers.

[3240]

DAVIES, C. W., *Notting-hill*.—Clock showing time and longitude at the most important places on the globe.

BROOKS, S. A., *Northampton Square, London, E.C.*—Watch jewels; sets of jewel gauges for watchmakers and material dealers.



The exhibitor manufactures the RUBY BOTTOMED HOLES for thin cocks or plates, and is also the Inventor and sole manufacturer of the JEWEL-HOLE GAUGE, for determining the size of pivots or jewel holes. Specimens of these manufactures are shown in his case. He can supply merchants and dealers in watch-material with every description of clock, chronometer, and watch jewels, set or unset; diamond-powder, bort, rubies, sapphires, chrysolites, garnet, &c.

The Export Watch-jewel Case (see engraving), with set jewels arranged and assorted, so that any size required may be instantly found, will be of great service to watchmakers or dealers in material residing in distant parts of the world. A broken jewel can be immediately replaced from it with the greatest accuracy, at a cost of little more than one-third the usual charge, and without the risk and loss of time attending the custom of sending to London the watch or part of watch requiring the jewel.

Persons who do not wish to keep a stock of watch jewels, can be supplied with the Jewel-hole Gauge, which will enable them, by sending the measure of the hole, to obtain the jewel of the exact size required, without the necessity of sending the balance or wheels to a jeweller, whereby risk of loss or damage is incurred.

The Jewel-hole Gauges are valuable for all purposes where accuracy is required, as they neither wear nor corrode. They are arranged as follows:—

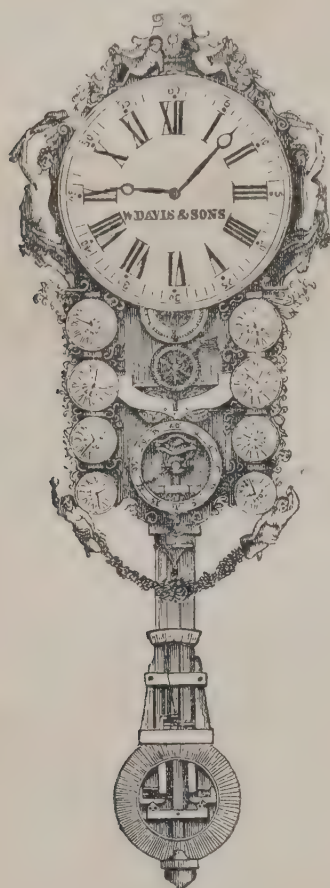
Gauge. Holes.

1. 1 to 12 inclusive, will gauge the escapement pivots to any modern watch.
2. 13 to 24 inclusive, will gauge the small wheel pivots of three-quarter plate and small frame watches.
3. 25 to 36 inclusive, will gauge the small wheel pivots to large frame watches.
4. 37 to 48 inclusive, will gauge centre wheel, also chronometer third and fourth pivots.
5. 49 to 60 inclusive, will gauge chronometer seconds' pivots.
6. 61 to 72 inclusive, will gauge regulator and clock-work pivots, also lower fusee and hollow centre pinions to watches.
7. 73 to 84 inclusive, will gauge small three-quarter plate fusee upper pivot.
8. 85 to 96 inclusive, will gauge large ditto ditto.
9. 97 to 108 inclusive, will gauge frame fusee upper pivot.
10. 109 to 120 inclusive, will gauge large frame fusee upper pivot.

A set of pivots, numbered to correspond in gauge with each jewel-hole can be supplied, for measuring the size of the hole required, should the balance or wheel-pivot of the watch be broken.

[3241]

DAVIS, W., & SONS, 84 *King William Street, City, London*.—Chronometers, watches, clocks, and specimens of horology.



The exhibitors are manufacturers of clocks, watches, and chronometers; jewellers; dealers in diamonds and other gems, and in onyx, shell, and other cameos; and importers of Geneva watches, French clocks, bronzes, &c. They keep on hand a stock of church and turret clocks, of various sizes, and constructed on approved principles. The time is given by electricity at their city establishment, from the Royal Observatory, Greenwich.

Davis and Sons have a branch establishment at 57 New Street, Birmingham.

[3242]

DELOLME, H., 48 *Rathbone Place, Oxford Street*.—Regulator, chronometers, clocks, and watches.

[3243]

DENT & Co., 61 *Strand*, and 34 & 35 *Royal Exchange*.—Chronometers, regulators, watches, and every description of time-keepers.

[3244]

DENT, M. F., Inventor and Manufacturer, 33 & 34 *Cockspur Street, Charing Cross, London, S.W.*—Watches, clocks, and chronometers; new auxiliary compensation balance. (See pages 69 to 71.)

[3245]

DE SOLLA, J., & SON, 34 *Southampton Terrace, Waterloo Bridge*.—Original manufacturers of the royal liliputian alarm clocks.

[3246]

DETTMAN, THEODORE, *Minories*.—Astronomical clock, constant ball escapement, compensation regulator, &c.; electro-magnetic clock, half-minute time.

[3247]

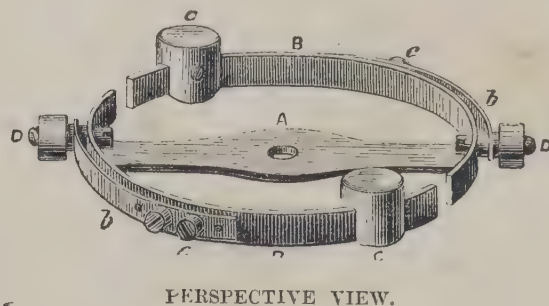
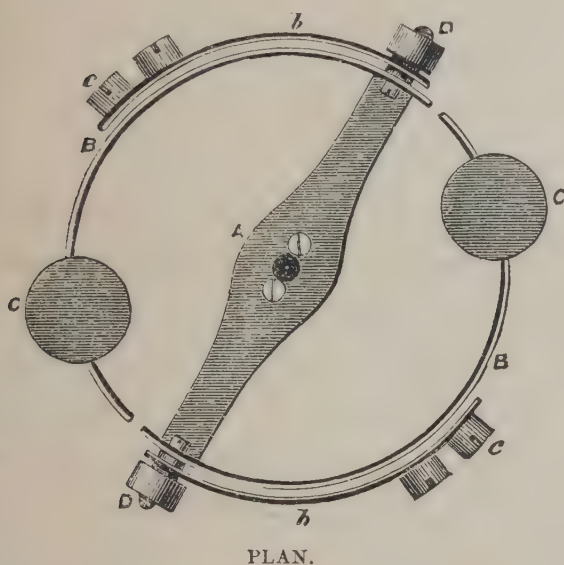
EHRHARDT, WILLIAM, 26 *Augusta Street, Birmingham*.—Various kinds of watches, and instruments connected with the manufacture thereof.

[3248]

FAIRER, JOSEPH, 188 *St. George's Street, E.*—The "Village Clock," and other turret clocks, watches, &c.

DENT, M. F., Inventor and Manufacturer, 33 & 34 *Cockspur Street, Charing Cross, London, S. W.*—Watches, clocks, and chronometers; new auxiliary compensation balance.

No. 1.—M. F. Dent's *new* compensation balance with outside auxiliary bows for extremes of temperature.



A is the bar of the balance.

B B are the compensation bows, the steel within and the brass without the rim.

c c are the compensation brass weights.

These parts are the same in form as the ordinary balance, but the bows are made thinner and lighter in order that they may move through a larger space. On the studs for the timing-screws (D D) are fastened two outside auxiliary bows (b b), the metals being reversed, namely, brass within and steel without the rim.

These auxiliary bows are provided with a row of screw-holes, and carry one or more platina screws (c c), which increase or diminish the action according to the distance they are placed from the timing-screw (D).

At present the range of the ordinary compensation balance is limited, because if the brass weight (c) is placed near the extremity of the bow, the balance is, in technical terms, "over compensated;" but this is qualified by the auxiliary action, which, being reverse to that of the primary bows, adds to the error which the primary balance is intended to compensate. This enables the weight c to be placed further out on the primary bow, and by the corresponding adjustment of the platina screws on the auxiliary, a much wider range is obtained of controlling power. The general effect is that the compensation power is greatly increased in high temperatures.

This new balance is simple in construction; all its bows act perfectly free, and the correction for high and low temperature is entirely under control.

2. A marine chronometer fitted with Dent's new auxiliary compensation.

3. M. F. Dent's model watch, in gold hunting-cases, lever escapement, compensation balance, with helical pendulum spring, winding and setting at the knob, and having fusee, and swivel pendant to prevent robbery; constructed to go *two* days without winding, and having dial indicator showing the time when last wound. This watch has the "*répétition à tact*," whereby the time can be ascertained by an external hand; *the only kind of watch that could be used by one who is deaf and blind.*

4. Gold hunting-cased watch with independent centre seconds, lever escapement, compensation balance, Brequet pendulum spring, winding and setting hands without key.

5. Gold hunting-cased chronometer with *perpetual* calendar.

6. Gold minute repeater in hunting-cases, keyless.

7. Gold hunting-case keyless watch, with lever escapement, compensation balance, engraved case, and ornamental dial. A specimen for the Spanish market.

8. Gold observation watch; a valuable instrument for timing the transit of a star, the phase of an eclipse, or for any purpose where delicate accuracy is essential to determine the exact time of commencement, continuance, and end of any period of observation.

The effect is obtained by having the centre seconds' hand double, one part closely overlying the other, so as to give the appearance of a single hand in ordinary action.

By pressing a knob at the pendant on commencing an observation the under hand is instantly stopped; but the upper hand will continue in action until—as the moment of observation ceases—the knob is pressed a second time; both parts of the seconds' hand are then stationary, and the exact interval of time observed is seen registered on the dial. The common action of the watch is not interfered with, it continues going, and on pressing the knob a third time the two parts of the seconds' hand immediately reunite and fly to the nearest point to correspond with the minute.

DENT, M. F.—*continued.*

9. A gold hunting-cased watch with duplex escapement and cylindrical pendulum spring.

10. A specimen of a gold hunting-cased watch, lever escapement, compensation balance, helical pendulum spring, winding without a key and having fusee.

11. A specimen of a plain gold hunting lever watch with extra fine cases.

12. A specimen of a gold open-faced chronometer watch.

13. A gold open-faced watch in imitation of Brequet's celebrated flat watches with eccentric dial and solid key.

14. Under a glass-shade—the movement of a chronometer watch taken to pieces; a specimen of high manipulation, and the most approved calibre.

15 and 16. A specimen of two ladies' gold watches, engraved cases.

17, 18, and 19. Three ladies' gold watches, lever escapements, compensation balances, keyless. The cases enamelled and set with diamonds, varied designs.

20. Gold open-faced watch, silver dial, keyless "*répétition à tact*." The bottom cover blue, enamelled with monogram in diamonds.

21. A specimen of a silver hunting-cased lever watch with compensation balance.

22. A miniature regulator with mercurial pendulum and remontoir train.

23. Gold open-face chronometer watch with patent fusee winding.

This chronometer watch is a facsimile of that made in 1859 by M. F. Dent, for Sir William Armstrong, the inventor of the Armstrong Gun, who certifies its actual variation at the end of a year to be only 45 seconds.

24, 25, 26, and 27. Four specimens of chronometer clocks, in gilt and German silver cases.

28. A chronometer clock, with patent balance for extreme temperatures, chiming the quarters upon eight bells, with perpetual calendar of the most perfect construction, indicating the days of the week and month, the phases of the moon, the equation and the bissextile, in a superbly finished case of gilt bronze and crystal glass.

29, 30. Two marine chronometers of the ordinary construction.

31, 32. Two time-pieces with duplex escapements compensated, gilt bronze cases, plain and engraved.

33. A boudoir time-piece, lever escapement, compensation balance; a gilt engraved case, silver dial.

34, 35. Two circular lever time-pieces with compensation balances, one in bronze and the other in a gilt bronze case; specially suitable as portable time-pieces.

36. A specimen of a library clock in bronze case, portable, lever escapement, compensation balance, chiming quarters.

37. A similar clock in ebony-case with improved gongs for fine tone.

The following are extracts from the reports of scientific persons as to the accuracy of Dent's horological instruments :—

Sir WILLIAM ARMSTRONG, inventor of the Armstrong Gun, says :—

"9 Hyde Park Street, W., 14th November, 1861.

"The chronometer watch you made for me in December 1859, has never been affected by travelling or riding; its variation at the end of a year was only 45 seconds. It has proved in every respect a most satisfactory watch.

"W. G. ARMSTRONG.

"MR. M. F. DENT,
33 Cockspur Street, Charing Cross."

The ASTRONOMER ROYAL, Greenwich Observatory, reporting in 1829 on the celebrated public trial, by order of the Lords of the Admiralty, which lasted thirteen years, during which nearly 500 chronometers were tested, says :—

"Your chronometer, No. 114, is entitled to the first premium. Actual variation in the year 54 hundredths of a second. This is superior to any other yet tried.

"J. POND, *Astronomer Royal.*

"MR. DENT."

The RUSSIAN IMPERIAL ASTRONOMER, M. STRUVE, of St. Petersburg, reporting upon 81 chronometers tested by the Russian chronometrical expedition, in 1843, says :—

"The Dent chronometers have held first rank in a brilliant manner. They contributed, beyond dispute, the most effectually to the exactitude of the results.

"M. STRUVE."

By command of the Emperor, the Russian gold medal of the highest order of merit was presented to Mr. Dent.

G. B. AIRY, Esq., Astronomer Royal (in testimony of the excellence of Dent's turret clocks), says :—

"Royal Observatory, Greenwich, 22nd July, 1845.

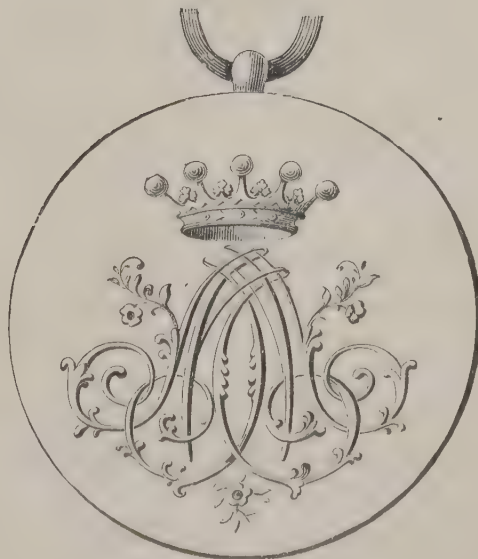
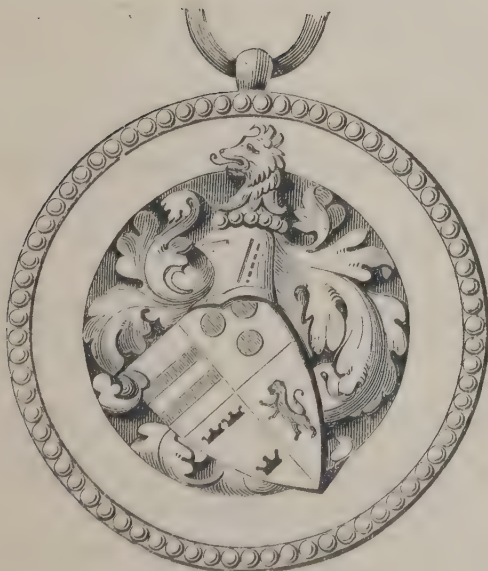
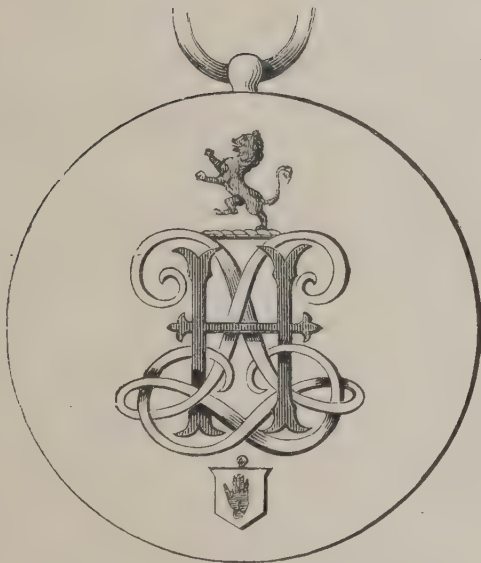
"I believe the clock which you have constructed for the Royal Exchange to be the best in the world as regards accuracy of going and of striking.

"G. B. AIRY.

"MR. DENT,
33 Cockspur Street, Charing Cross."

DENT, M. F.—*continued.*

38, 39. Specimen drawings of heraldic and other designs, richly executed in enamel and jewels upon the cases of watches, made to special order. The following are a few selections :—



[3249]

FORREST, JOHN, 29 *Myddelton Street, E.C.*—Every description of pocket watches, various escapements and springs—London work.

The following specimens of fine London work are exhibited :—

Pocket chronometer, spiral spring.
Duplex chronometer, Brequet spring.
Lever chronometer, ditto.
Duplex $\frac{3}{4}$ jewelled tongue, ditto.
Duplex frame, ditto, capped, ditto.
Two-pin lever, ditto, ruby roller, ditto.
Best one-pin. Lever, new balance.
Do. $\frac{3}{4}$ lever with fly cap.
Independent centre seconds, double train.
Ditto ditto single train.
American block work.

£ s. d.

Samples of watches which can be supplied by the exhibitor at the prices quoted per dozen :—

$\frac{3}{4}$ -Plate gold dome hunters, compensated	..	..	..
$\frac{3}{4}$ Ditto consular, ditto	..	..	..
$\frac{3}{4}$ -Plate gold hunters.	..	from 156	0 0
$\frac{3}{4}$ Ditto consulars . . .	..	do. 138	0 0
Gent's ditto frame hunters . . .	..	do. 132	0 0
Ditto consulars . . .	..	do. 126	0 0
Ladies' $\frac{3}{4}$ -plate ditto . . .	..	do. 132	0 0
Ladies' frame ditto . . .	..	do. 96	0 0
Silver $\frac{3}{4}$ -plate hunters, compensated . . .	..	..	..
Silver $\frac{3}{4}$ -plate hunters . . .	..	do. 76	0 0
Ditto consulars . . .	..	do. 63	0 0
Silver frame hunters . . .	..	do. 50	0 0
Ditto consulars . . .	..	do. 43	0 0

[3250]

FRODSHAM, CHARLES, 84 *Strand, London.*—New caliphers of chronometers, watches, and astronomical clocks; new equation double compensation balances. (*See page 73.*)

[3251]

FRODSHAM & BAKER, 31 *Gracechurch Street, City.*—Chronometer, watch, and clock manufacturer to the Admiralty.

[3252]

GANEVAL & CALLARD, 27 *Alfred Street, Islington.*—Watch, pendulum, spring, and wire manufacturers.

[3253]

GREENWOOD, J., & SONS, 6 *St. John's Square, E.C.*—Quarter and bracket clocks; regulators, dials, and cases.

[3254]

GUIBLET & RAMBAL, 11 *Wilmington Square, Clerkenwell, London.*—Keyless fuzee watches for scientific purposes; pocket chronometers.

[3255]

GUILLAUME, EDWARD & CHARLES, 16 *Myddelton Square, E.C.*—Watches and repeaters.

[3256]

GUMPEL, CHARLES GODFREY, 2 *Gordon Cottages, Holland Road, Brixton.*—A system of electric clocks.

[3259]

HAWLEYS, 287 *High Holborn.*—Regulator—only requires winding once in twelve months.

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HEYES, THOMAS, Manufacturer, *Appleton, Widnes, near Warrington, Lancashire.*—Steel and brass wire for pinions, clicks, screws, &c. (*See 3295—PRESOTT COMMITTEE.*)

Pinion wire in steel and brass, round steel and other wires, and pinion wire gauges.

[3260]

HIGHFIELD BROTHERS, 5 *King Edward Terrace, Liverpool Road, N.*—Marine and pocket chronometers, duplex and lever watches, and an improved regulator.

[3261]

HILL, CHARLES JOHN, late W. H. HILL & SONS, *Chapel Fields, Coventry.*—Watches and patent pearl dials.

FRODSHAM, CHARLES, 84 Strand, London.—New caliphers of chronometers, watches, and astronomical clocks; new equation double compensation balances.



[Obtained, in 1831, the Government Premium Prize of £170; in 1848, the Telford Medal; in 1851, at the Great Exhibition, the First Class Medal; in 1855, at the Paris Exhibition, the Gold Medal of Honour; in 1860, the Grand Gold Medal "Pramia Digno," from the Imperial Russian Government, for the superior performance of his Chronometers during the great Russian survey.]

The following specimens of high-class horological workmanship are exhibited:—

Pocket chronometers, chronometer repeaters, stop-split centre seconds, and other timing and stop-watches.

Specimens of his "new series" lever chronometer watches, drawn to an entire new caliper of unrivalled timekeeping properties.

A month marine chronometer.

Large eight-day and two-day marine chronometers.

New model eight-day and small two-day marine chronometers, drawn to new and defined proportions, with important and useful changes, all founded on reliable measurements, and the result of long, accurately noted experiments.

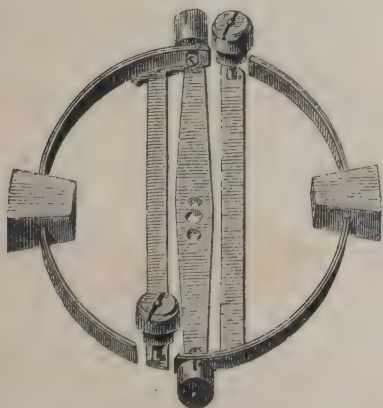
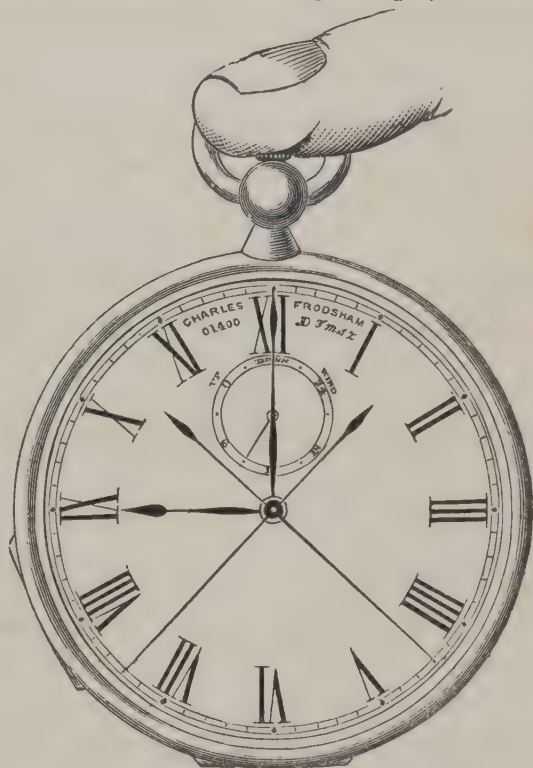
Astronomical and sidereal clocks, with important improvements, the result of long-continued and accurate experiments.

Specimens of portable regulators, carriage clocks with compensation balances and chronometer escapements.

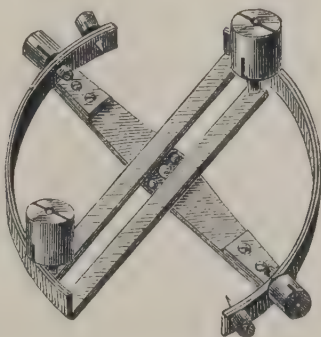
Carriage clocks, with lever and chronometer escapements of the highest and finest adjustments.

Small chime clocks.

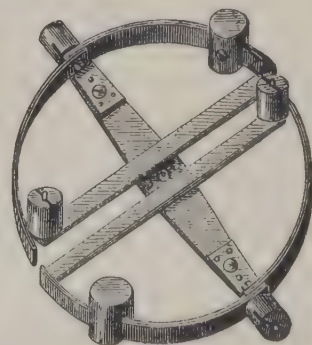
Instructive specimens of new chronometer and watch movements.



Double compound Micrometric Equation balance, invented and fecit by C. Frodsham.



Compound double inverted Differential balance, invented and fecit by C. Frodsham.



Compound triple Equation balance, invented and fecit by C. Frodsham.

An instrument to illustrate the motion of the compensation balance, showing the causes of the losing error in the extremes of temperature.

New double compensation balance of great accuracy.

New double compensation micrometric balance, extremely sensitive to sudden changes of temperature.

A model church and turret clock, constructed after designs proposed for the clock of the New Houses of Parliament, of astronomical accuracy.

C. FRODSHAM also exhibits an entirely new system of nomenclature for chronometer and watchmaking.

Tables to facilitate their construction.

New "Duo in Uno" balance springs for perfecting the adjustments of high-class watches and chronometers in their various positions.

New standard to facilitate universally the measurement of watches, with tables of comparisons and coincidences in French new and old measurements, and a work to exhibit CHARLES FRODSHAM's system of chronometer, watch, and clock making.

He also exhibits the model of the chronometer-maker's ice-box and oven. C. F.'s new differential compensation balance, perfect for every degree of temperature, will not be ready for exhibition until August.

[3262]

HISLOP, WILLIAM, 108 *St. John Street Road, London*.—Standard or observatory clock, showing mean and sidereal time.

This clock is especially intended as a standard time-keeper. The arrangement for showing sidereal time by means of a supplementary dial may be applied to any clock, and may show mean time when the primary dial shows sidereal time. It prevents the necessity of reducing by calculation a sidereal observation to mean

time, or vice versa. The wheelwork may also be applied to show both times on a single dial. Price of clock complete, 60 guineas; in a plain case, from 35 guineas. Sidereal dial work, independent of fittings and adjustment to clock, 10*l*.

[3263]

HOLDSWORTH, SAMUEL, 220 *Upper Street, Islington, N.*—Chronometer and watch jewels: chronometer pallets and duplex rollers.

[3264]

HOLL, FREDERICK RICHARD, 284 *City Road*.—Patent non-winding chronometers and watches.

[3265]

HOLLIDAY, THOMAS, 304 (late 108) *Goswell Road, London*.—Gold, silver, and metal watch-case and dial maker.

[3266]

HOLLOWAY & Co., 128 *Minories, and New Square, London*.—Pendulum and lever clocks of the simplest construction.

[3267]

HOWARD, RAYMOND, 29 *King Square, Goswell Road*.—Sunk seconds dial maker and enamel maker.

[3268]

HOWELL, JAMES, & Co., 5, 7, 9 *Regent Street*.—Clocks, watches, &c. (*See page 75.*)

- Fig. 1. English ormolu candelabra.—Gothic.
- Fig. 2. Ditto ditto clock, silver dial.—Gothic.
- Fig. 3. Ormolu candelabra, jewelled enrichments.—Moresque.
- Fig. 4. Elaborate pierced star timepiece.—English Gothic.
- Fig. 5. Pierced ormolu timepiece.—Mediæval.

- Fig. 6. Ormolu travelling 8-day timepiece.—Registered padlock.
- Fig. 7. Ormolu clock, jewelled enrichments, silver dial.—Moresque.
- Fig. 8. Ormolu 8-day travelling timepiece.—Registered horseshoe.

[3270]

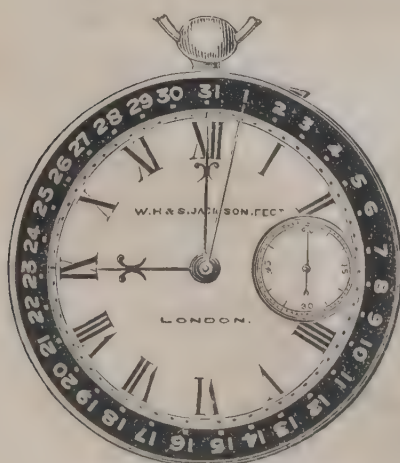
HUTTON, JOHN, 10 *Mark Lane, London*.—Marine chronometers, Hartnup pocket chronometer, and other sorts; improved cheap watches.

[3271]

JACKSON, W. H. & S., 66 *Red Lion Street, Clerkenwell*.—Chronometers, day of month, keyless, and other watches.

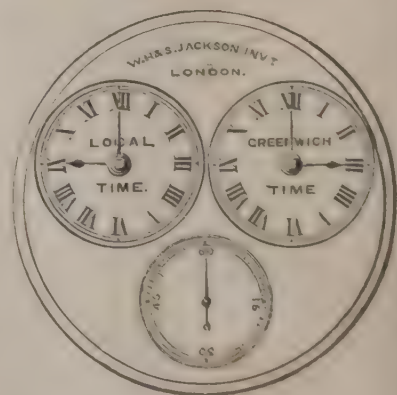
[*Obtained a Prize Medal in Class X., 1851.*]

The following specimens of chronometers and watches, day of month, eight day, local and mean time, keyless, solid key, with several improved modifications of the lever escapement are exhibited:—



DAY OF MONTH WATCH.

- A. Two-day marine chronometer.
- B. Pocket chronometer.
- C. Day of month, adjustable, with ruby solid impulse lever escapement.
- D. Eight-day (fuzee), with J. F. Cole's resilient pallet.
- E. Watch (toothed barrel, solid key), with J. F. Cole's patent repellant lever escapement.
- F. Watch showing local and mean time from one train. Hands set independently; lever escapement, with horizontal ruby pin, adjustable.
- G. Various keyless and solid key watches.
- H. Tool for indicating pallet angles and arc of lever escapement.



EXTERNAL ARRANGEMENT OF LOCAL AND MEAN TIME WATCH.

HOWELL, JAMES, & Co., 5, 7, 9 Regent Street.—Clocks, watches, &c.



Fig. 1.

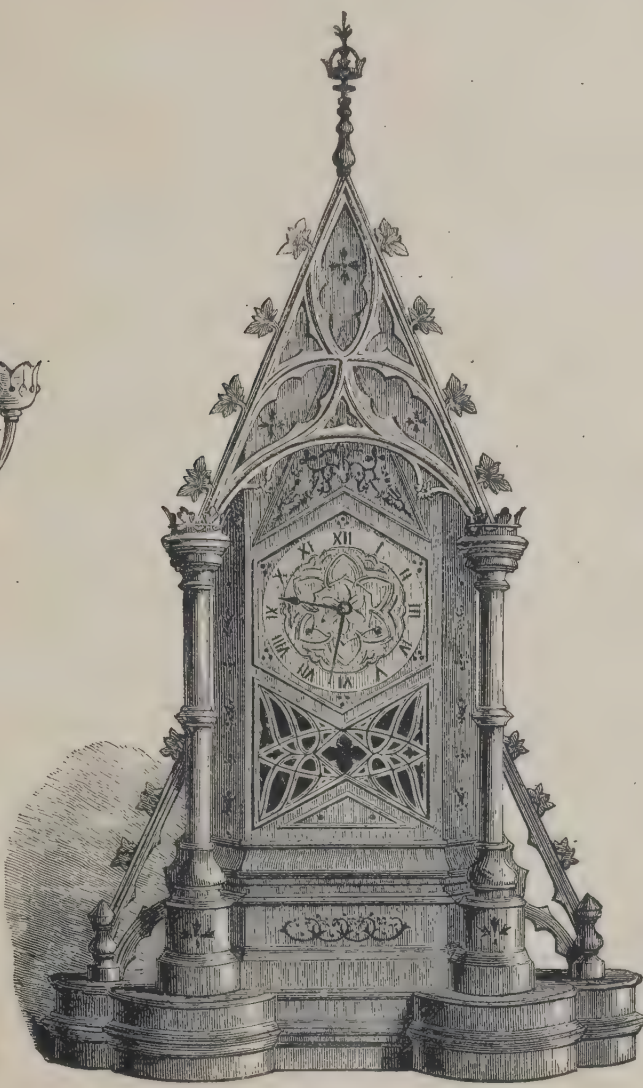


Fig. 2.

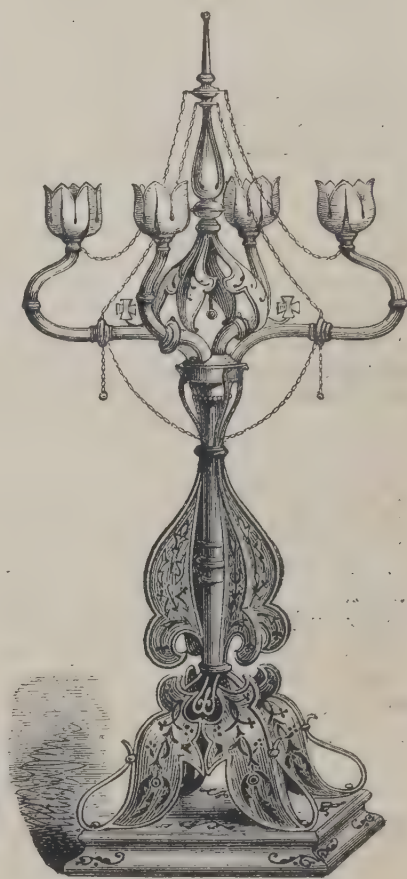


Fig. 3.



Fig. 4.

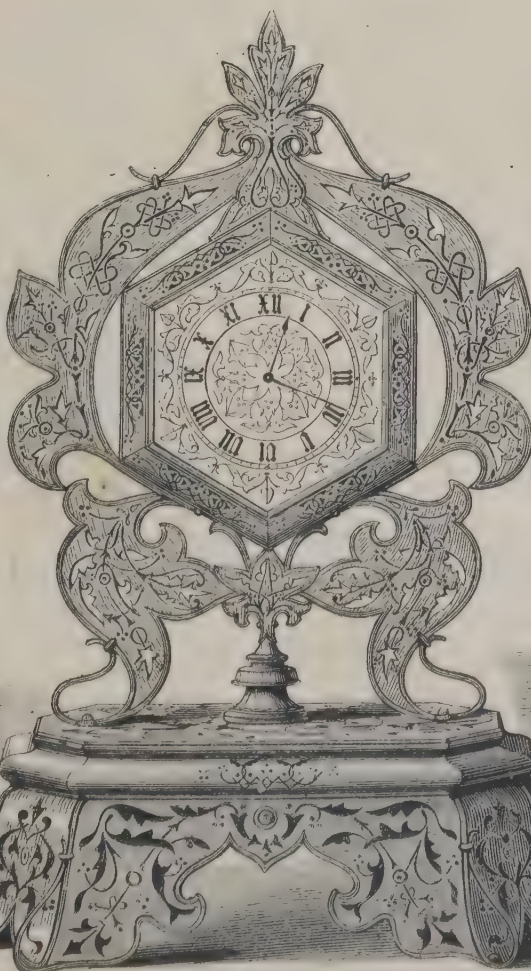


Fig. 7.



Fig. 5.

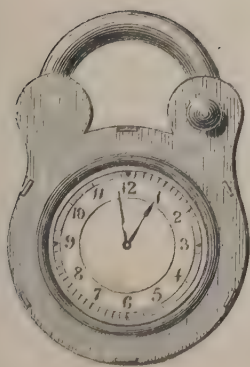


Fig. 6.

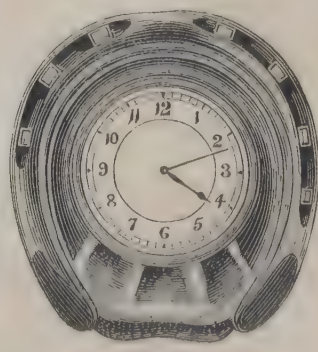


Fig. 8.

[3272]

JOHNSON, EDWARD DANIEL, 9 *Wilmington Square, Clerkenwell, London*.—Chronometers, watches, pendulums, horological machinery, and various improvements and inventions.

MARINE CHRONOMETERS, eight-day and two-day.

HERMETIC BOX for Marine chronometer.

Magnetic Disperser for Marine chronometer. Rotating machinery in the case causing the chronometer to revolve on its own axis in 24 hours, thus dispersing the effects of local magnetism.

Surveying Chronometer. An ordinary small-sized two-day movement, fitted in a silver case as well as the ordinary gimbals, so as to make it portable in the pocket as well as suitable to the navigation of a ship. Removed from its gimbals by turning round the glass cover.

Pocket Chronometers, half plate and frame.

Duplex watches, half plate.

Lever watches, half plate and three-quarter.

Railway watches, full plate and three-quarter.

"Automaton seconds" watches. Keyless watches.

Combination of both these last.

"Universal seconds," a new watch, designed and patented especially to commemorate the Exhibition of 1862 horologically; consisting of a new caliper and train of wheels, effecting the union of "Automaton seconds" and permanent side seconds without complexity.

A new Escapement for Equatorial Telescopes, for circulating pendulums; consisting of a single crank motion, giving freedom to the motion of the pendulum, with the equable continuous rotary motion to the telescope required.

New and improved models of mercurial pendulums.

Model suspensions for pendulums.

New auxiliary compensator for wooden pendulums; can be applied to any pendulum in one minute, at a cost of 7s. 6d. It consists of a glass tube, divided into

two chambers by being drawn out into an upper and a lower part, joined by a small tube; the lower, and part of the upper chamber containing mercury. This arrangement effects the transposition of small quantities of the mercury long distances, doing proportionately more work. Adjustable by a screw at the bottom.

Model of a public Timeball, discharged by electric current from Greenwich Observatory.

Groups of watch-movements, showing various constructions and qualities of workmanship.

Manufacturer of Chronometers and Watches, of which fair samples only are exhibited in Class 15. No article among those shown is made at unnatural expense on purpose to show, but each is a fair representation of his ordinary work, and his stock is manufactured of the same material and workmanship.



Inventor and Patentee of:—

The automaton-seconds watch.

The self-contained winder.

The magnetic disperser.

The hermetic box or chronometer safe.

The universal seconds watch.

And manufacturer of goods for all the foreign markets, on the models specially suited to each.

Patronized by the Admiralty.

[3273]

JONES, JOHN, 338 *Strand*.—Watches.

Case containing the following specimens of watches:—

1st Row.—Ladies' gold watches, with a new application of jewels in the notation of minutes on the dials, and decorated cases.

2nd Row.—Gold watches, with a new application of colour for the adornment of enamel dials appropriate for ladies' use.

3rd Row.—Specimens of the perfection of railway watches adjusted for position and temperature; also 2-day watches with correct adjustments.

4th Row.—Gold $\frac{3}{4}$ -plate hunting levers, with specimens of the most perfectly proportioned escapements that the trade can produce, with Isochronal springs and compensated balances.

5th Row.—Gold hunting lever watches, with newly arranged spring caps, suitable for use in foreign climates.

6th Row.—Silver levers to compete with the foreign manufacturer in price while retaining the English superiority in quality, 3l. 3s. each.

[3275]

KLAFTENBERGER, CHARLES J., 157 *Regent Street*.—Minute repeaters, chronometers, &c.

[3276]

KULLBERG, V., 12 *Cloudesley Terrace, N.*—Chronometers, watches, and clocks.

[3277]

LANGE, CHRISTIAN, 9 *Salisbury Street, Strand, London*.—Watches and timepieces.

[3278]

LEONARD, G. W., 1 *Cloudesley Terrace, Liverpool Road*.—Compensation balances.

[3279]

LOSADA, JOSÉ R., 105 *Regent Street*.—Watches, marine chronometers, table clocks, turret clocks, and astronomical pendulums. (See pages 78 & 79.)

[3282]

MARRIOTT, BENJAMIN, 38 *Upper Street, Islington, London*.—Watches, gold chains, &c.

[3283]

MERCER, THOMAS, 45 *Spencer Street, Clerkenwell*.—Marine chronometers.

[3284]

MOORE, B. R. & J., 38 *Clerkenwell Close*.—Turret and other clocks.

[3285]

MORRIS, WILLIAM, *Blackheath, S.E.*—Electric regulator with centre seconds, and other companion clocks, all beating simultaneously.

[3286]

MUIRHEAD, JAMES, & SON, *Glasgow*.—House, turret, and railway clocks, &c.

[3287]

MURRAY, JAMES, 30 *Cornhill, London*.—Chronometers, watches, clocks, patented keyless watches, patented regulator, models, jewelry, &c.

[3288]

NEAL, JOHN, Watchmaker and Jeweller, 18 *Edgware Road, London, W.*—Jewelry; onyx clocks; duplex, lever, and chronometer watches—new construction.

[3289]

NICOLE & CAPT, 14 *Soho Square*.—Nicole's patent keyless watch and conteur.

[3290]

ORAM, GEORGE JOHN, 19 *Wilmington Square, Clerkenwell*.—Watches.

[3291]

PARKINSON & FRODSHAM, 4 *Change Alley, Cornhill, E.C.*—Chronometers, watches, regulators, astronomical clocks, &c.

[3292]

PLASKETT, WILLIAM, 12 *Alderney Road, Globe Road, Mile End, London, N.E.*—Marine chronometers with improved compensation.



These chronometers are manufactured with improved compensating auxiliary balances for correcting the difference of time occasioned by extreme temperature. They are also furnished with air-tight valves which perfectly exclude all damp from the works.

[3293]

POOLE, JOHN, 57 *Fenchurch Street, London*.—Marine and pocket chronometers and watches.

[3294]

PORTHOUSE & FRENCH, 16 *Northampton Square, Goswell Road*.—Specimens of marine chronometers and watches for home and foreign markets.

[3295]

PRESCOTT COMMITTEE FOR THE EXHIBITION OF TOOLS, HOROLOGICAL INSTRUMENTS, &C.:—

Preston, J.
Hewitt, S. & J.
Wycherley, J.
Copple, J. & W.
Scarisbruk, C.
Hunt, J., & Co.
Ford, R.
Welsby, J.

Brown, Ann.
Johnson, C. B.
Houghton, S.
Pendleton, P.
Stockley, Jas.
Taylor, Richard.
Preston, Wm.
Saggerson, E.

Molyneux, Wm.
Whitfield, J. J.
Alcock, J.
Jacques, J.
Smith, J.
Naylor, Thos.
Heyes, Thos.

[3297]

QUAIFE, THOMAS, Clockmaker, *Hawkhurst, Kent*.—Chime clock, fifty changes, in marble and gold; and chronometer.

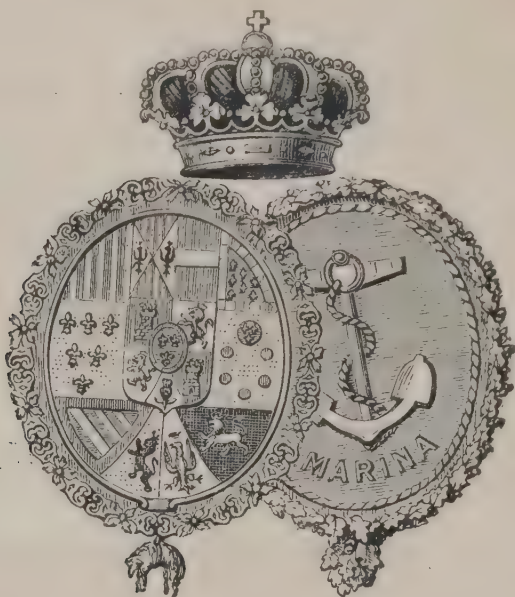
[3300]

ROTHERHAM & SONS, *Coventry*.—Gold and silver watches, and parts of a watch in every stage of manufacture.

[3302]

RUSSEL, THOMAS, & SON, *Liverpool*.—Watches, hard tempered nickel movements, patented; especially adapted to hot climates.

LOSADA, JOSÉ R., 105 *Regent Street*.—Watches, marine chronometers, table clocks, turret clocks, and astronomical pendulums.



DE S.S. M.M. C.C., REAL FAMILIA Y ARMADA MILITAR.

[*Thrice decorated by her Catholic Majesty for merit in his art.*]

1. Astronomical pendulum, escapement jewelled, in glass case.
2. Two astronomical pendulum movements complete, escapements jewelled, dials unfinished.
3. Musical chiming clock, to strike the quarters on eight bells, and the hours on a deep gong; plays one of four different overtures at each of the hours; in rosewood case, gilt engraved dial.
4. Same as No. 3, in oak case and silvered dial.
5. Chiming quarter clock, with centre seconds and duplex escapement, compensated and adjusted, carved mahogany case, with carved dolphins as supports, gilt engraved dial.
6. Skeleton centre seconds clock, under glass shade, with chronometer and escapement compensated and adjusted, with emblem of *Fidelity*.
7. Small table chronometer with brass engraved and gilt case, and gilt engraved dial.
8. Ting tong carriage clock, with lever escapement, brass gilt case, and gilt engraved dial.
9. Binnacle clock, with lantern and reflector, lever escapement compensated and adjusted, brass bronzed case.
10. Cabin dial, with lever escapement compensated and adjusted, in black mahogany case.
11. 8-day marine chronometer.
12. 2-day ditto.
13. Two marine chronometers in construction.
14. Two silver acompañantes with mahogany case.
15. Gold hunting grand clock watch, to strike the hours and quarters, and to repeat the hours and quarters every quarter of an hour, and hours, quarters, and minutes at pleasure, showing the days of the week and month. Jewelled in 40 holes.
16. Gold hunting clock watch to strike the hours and quarters, and to repeat the hours and quarters every quarter of an hour, and at pleasure. Jewelled in 24 holes.
17. Gold hunting minute repeater. Jewelled in 24 holes. Highly ornamented.
18. Gold hunting half-quarter repeater. Jewelled in 20 holes. Highly ornamented.
19. Gold hunting duplex watch, to show 6 different meridians. Jewelled in 8 holes.
20. Gold hunting pocket chronometer, 13 jewels. Highly ornamented.
21. Gold hunting pocket chronometer, 13 jewels. Plain.
22. Gold hunting duplex, independent centre seconds. Jewelled in 20 holes. Highly ornamented.
23. Gold open face, ditto, ditto. Plain.
24. Gold hunting duplex, centre seconds. Highly ornamented.
25. Gold open face duplex, centre seconds.
26. Gold hunting duplex watch. Highly ornamented.
27. Gold demi-hunting watch. Highly ornamented.
28. Gold hunting duplex watch. Plain.
29. Gold demi hunting lady's duplex keyless watch. Highly ornamented.
30. Gold hunting lever watch. Highly ornamented.

LOSADA, JOSÉ R.—*continued.*

- 31. Gold hunting lever watch. Plain.
- 32. Gold demi hunting lever watch.
- 33. Gold hunting lady's lever watch. Highly ornamented.
- 34. Gold hunting lady's lever watch. Plain.
- 35. Watches in construction.
- 36. Silver hunting duplex watch.

- 37. Silver hunting lever watch.
- 38. Three orders, conferred by her Catholic Majesty Isabella the Second for merit in his art, viz. :—
 - a. Cross of Charles the Third.
 - b. Orders of Comendador de Numero of Isabella the Catholic.



39. A very elegant brooch, being the device borne on the reverse of the Mexican doubloon, and representing the secretary bird destroying a serpent; the body of the bird is composed of a very large pearl; the head, neck,

wings, tail, and feet of brilliant and rose diamonds, on a spray, also of diamonds and gold, with a large single pendant, the snake of gold beautifully enamelled; the whole set in gold.

Vease anuncio en los Catálogos é Iluminado.

[3303]

SAMUEL, A., & SON, 29 *Charterhouse Square, E.C.*—Various descriptions of English watches, manufactured by exhibitors.

[3304]

SANDERS, JOHN, 15 *West Bar, Sheffield.*—Regulator, timepiece, and keyless watches.

[3305]

SCHOOF, WILLIAM GEORGE, 9 *Ashby Street, Northampton Square.*—Regulator, with detached escapement and mercurial pendulum.

[3306]

SEWILL, JOSEPH, 61 *South Castle Street, Liverpool.*—Gold and silver watches; pocket and marine chronometers.

[3307]

SHEPHERD, CHARLES, 53 *Leadenhall Street, City.*—Galvano-magnetic clocks.

[3309]

SMITH, J., & SONS, *St. John's Square, Clerkenwell, London.*—Church, turret, and house clocks, &c.; illuminated and other dials. (See page 81.)

[3311]

STRAM, NUMA, *Ashby Street, Northampton Square.*—Reversible and self-winding watch.

[3312]

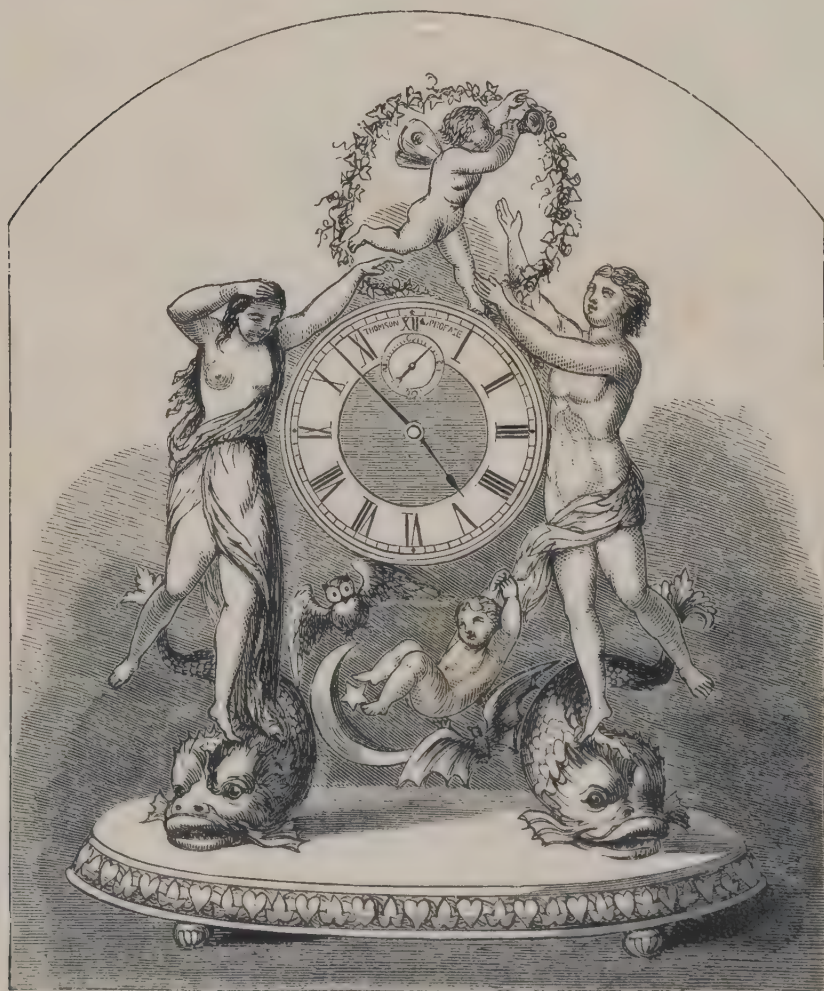
STRATH BROTHERS, 7 *Park Terrace, Camden Town.*—Models of the English and Geneva watches.

[3313]

TANNER & SON, *Lewes.*—Clock with perpetual register of day, week, and month—requires no correction.

[3316]

THOMSON & PROFAZE, 25 *New Bond Street, W.*—Watches, clocks, timepieces, “tell-tale,” and jewelry.



English skeleton clock, supported by figures emblematic of day, night, twilight, and dawn, designed and manufactured by the exhibitors. English chronometer repeating clock. The specimen of engraving on brass case is unique. Chronometer timepiece in gilt case, ornamented with river gods, &c.

English timepieces of various kinds.

Tell-tale timepiece registering time within five seconds; could be adapted for astronomical and meteorological observations. English watches with the latest improvements, winding and setting hands by pendant, the engraving and enamelling on cases of the best and most elaborate description. Gold chains, &c.

Marine set, bracelet, brooch, necklet and earrings with dolphins and shells enamelled and set with rubies, emeralds, and diamonds.

Further particulars may be learned upon application.

SMITH, J., & SONS, *St. John's Square, Clerkenwell, London.*—Church, turret, and house clocks, &c.; illuminated and other dials.

1. Turret clock tower and summer-house, with eight-day turret striking clock, with four faces 3 ft. 6 in. diameter, intended for illuminating. The clock is constructed on the repeating principle; has maintaining power to keep it going during winding; inside dial plate to set the four pairs of outside hands by; and various other improvements. The clock tower is surrounded by seats and bronze rail, and surmounts the summer-house, which has wings that may be used for choice flowers, &c. The intention of the whole arrangement is to supersede the old custom of placing a turret clock on stables, by rendering this most useful article an ornament to the park, lawn, or ornamental garden.

2. Turret timepiece, suited for railway termini or public buildings, stables, &c.

3. Eight-day skeleton clock, strikes on cathedral tone gong, and the half-hour on bell. The decoration of this clock is of a very elaborate character.

5. Skeleton striking clock (design, Temple of Flora).

6. Ditto ditto, plain design.

7. Eight-day chiming bracket clock, in carved oak case of Old English style, introducing dolphins and acorns; chimes the quarters on eight musical bells, and strikes the hours on a gong.

8. Striking bracket clock, carved oak case (new design).

9. Ditto ditto ditto, solid mahogany carved case.

10. Ditto ditto ditto.

11. Regulator or astronomical clock, mercurial compensated pendulum, suited for a gentleman's hall, ornamental carved Spanish mahogany case.

12. Detector clock, or watchman's clock, which, in addition to forming a bracket timepiece, detects and registers neglect of duty in watchmen or night wardens.

13. Skeleton eight-day striking clock, mosque pattern.

14. Model of the turret clock tower and summer-house, erected by Messrs. J. Smith and Sons in the Eastern Annex, Class IX.

15. Various models and samples of eight-day office shop dials. Clocks for various climates, all manufactured by the exhibitors.

16. Samples of materials and tools used in the manufacture of English clocks.

17. Eight-day turret or church clock, of the same construction and material as that supplied by the exhibitors to the order of the Government Department of

Science and Art, and which may be seen in the Museum, South Kensington. The wheels and bosses for the pivots to act in are of gun metal, the mixture being the same as that used for the manufacture of ordnance-bearings, the pinions of wrought steel, cut and finished in an engine as well as the wheels; thus securing the greatest possible accuracy. The frames are of iron, and so constructed that any part can be removed for cleaning without disturbing the remaining parts. The escapement is on the principle of Graham's dead beat, and the steel pads are made to slide in turned grooves, so as to set the pitch with the greatest exactness; they may be removed, as they are secured by screws. The striking apparatus is on the repeating principle, which prevents the possibility of striking wrong hours—a fault so common in many clocks with locking plates. The maintaining power to keep the clock going during winding is by lever and bolt; there is a small inside dial to set the hands by. The pendulum has a heavy spherical ball, and the rod, which is of prepared pine, coated with varnish and afterwards French polished, is thus secured against the action of air or damp; the pendulum is set in beat by means of a traversing screw, and the crutch has also two large screws to regulate and reduce its friction.

18. Metal drum case dial, made expressly for India, China, and tropical climates. The face of this is twelve inches diameter, though all sizes are made on the same principle and construction. The front of the case solid brass, with thick plate-glass; the movement has jointed steel chain, and neither case nor clock can be injured by climate or insects.

19. Revolving machine, strong spring movement in mahogany box, with circular plate, for the exhibition of figures in shop windows; adapted for "hairdressers," models, &c., &c.

20. Small models of office dials in oak, walnut tree, and mahogany, carved in various styles, suited for public buildings, lecture-rooms, in Elizabethan, Gothic, Grecian, Mediæval, and modern styles of architecture.

21. Illuminated dial, for outside of public buildings; the numerals, minute stops, and mouldings are of copper, and glazed with opal glass. By the construction of this dial perfect distinctness and durability are secured, and the gas light equally diffused over the surface of the clock face.

22. Eight-day school dial in solid oak case.

23. Eight-day bedroom clock with alarm.

24. Eight-day striking kitchen or country clock in long case.

WHITE, EDWARD, 20 *Cockspur Street, Pall Mall, S.W.*—Chronometers, watches, clocks, and gold chains.

No. 1. A monthly astronomical clock, with mercurial compensation pendulum, and pallets jewelled with sapphires.

CHRONOMETERS.

2. An eight-day marine chronometer.
3. A two-day do. do.
4. A ditto, with auxiliary compensation.
5. An eight-day chronometer timepiece, in plain gilt metal case, with enamel dial and engine-turned gilt dial cover.
6. A smaller do., in ornamental gilt metal case with chased columns, enriched mouldings and chased lion on top. (Registered design.)

PORTABLE CLOCKS.

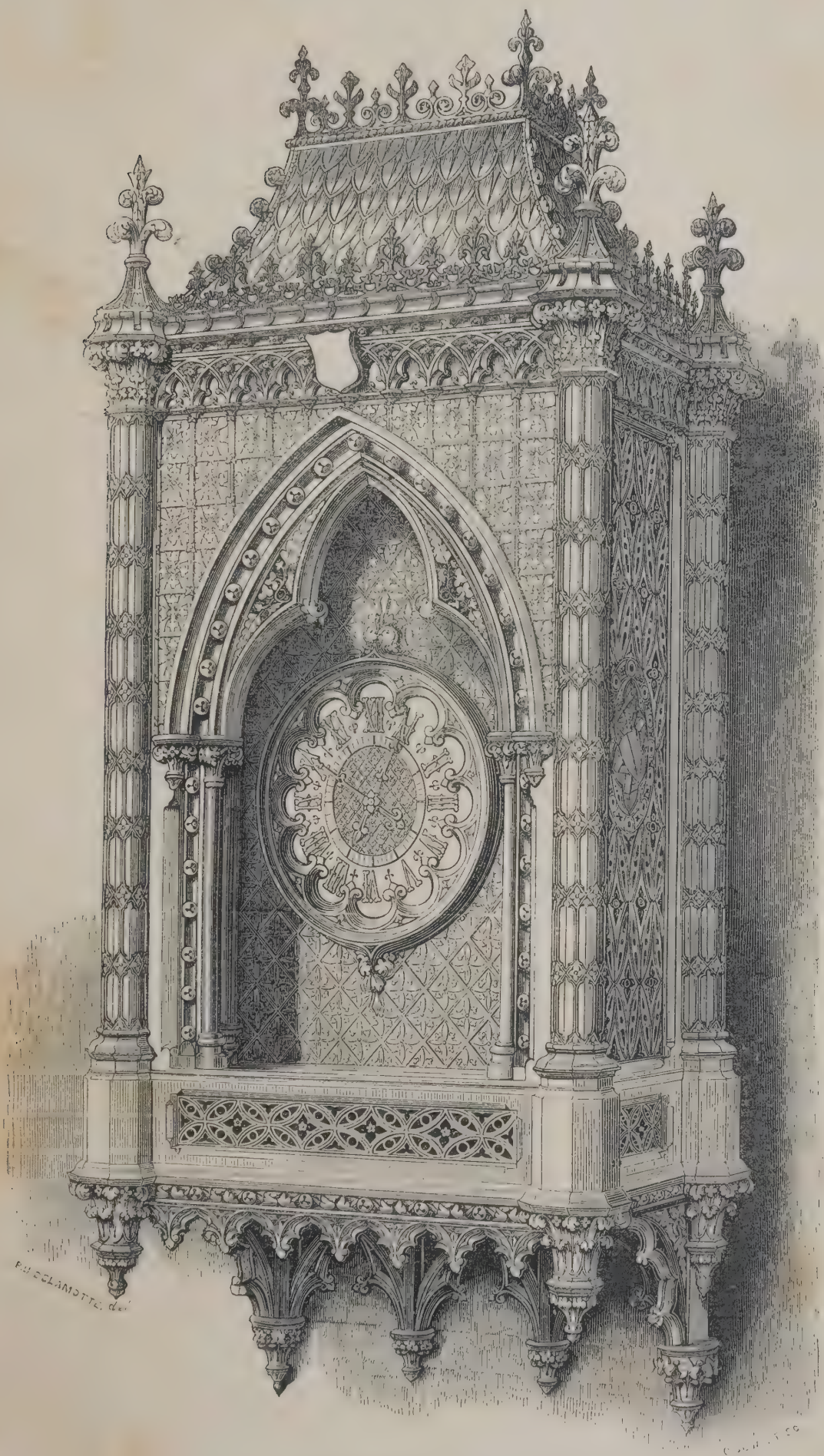
7. An eight-day lever clock with compensation balance (striking hours and half-hours, and repeating the last hour on bell-spring, with very fine cathedral tone), in German silver case.
8. A do. of different pattern.
9. A do. in bronze metal case.
10. A do. chiming the quarter on four bells (Cambridge chimes) and striking the hours on bell-spring, in very handsome gilt metal case, with chased columns and figure on top. (Registered design.)



GILT DRAWING-ROOM CLOCK, "THE TRIUMPH OF NEPTUNE."

11. A gilt drawing-room clock, "The triumph of Neptune," with base and columns of Algerine onyx, designed by E. W., manufactured and registered by his agent at Paris.

WHITE, EDWARD—*continued.*

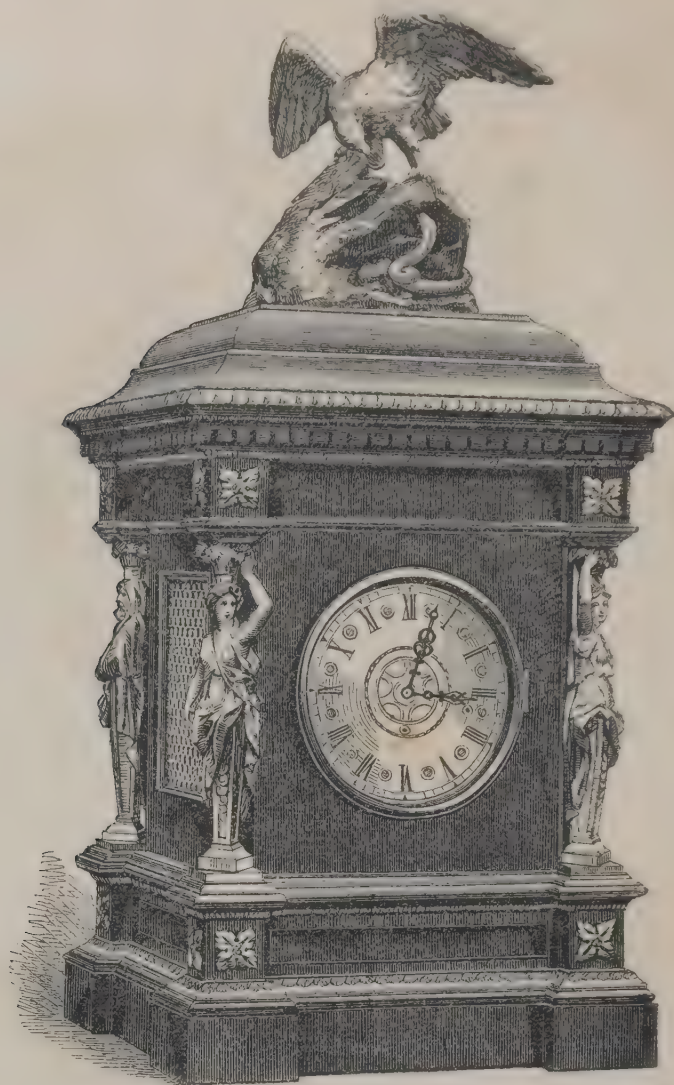


GOTHIC HALL CLOCK.

BRACKET HALL CLOCKS.

12. An eight-day clock, striking hours on bell-spring, and quarters on four bells, in richly carved oak case, with columns, roof, crockets, finials, crestings, and panels in polished brass. (Registered design.)

WHITE, EDWARD—*continued.*



13. An eight-day 3 part quarter clock, chiming the quarters on 4 bell-springs, and striking hours on large ditto. Black wood case with chased gilt metal mouldings; the cornice supported by caryatid figures of the four seasons, and with eagle on top. (Registered design.)

14. A ditto chiming quarters on four bells (Cambridge chimes), and striking hour on large bell. Carved Gothic case of various woods. (Registered design.)

15. A ditto in carved oak Gothic case with crockets, crestings, finials, and side panels in polished brass. (Registered design.)

16. A case containing eighteen specimens of monograms, arms, crests, &c., in engraving, enamelling, and precious stones.

KEYLESS WATCHES.

17. A gold hunting pocket chronometer, with two dials—one to show English and the other Turkish time—the case richly engraved with oak leaves and acorns, and with very handsome gold Albert chain to correspond.

18. A gold hunting minute repeater, with dark-blue enamel dial to show the repeating work in the centre—the case richly engraved with vine leaves and grapes, and with very handsome gold Albert chain to correspond. (See opposite page.)

19. A gold hunting quarter repeater, with duplex escapement and compensation balance—the case ornamented with “lilies of the valley,” the leaves being in green enamel and the flowers in diamonds, and with brooch and chain to correspond. (See opposite page.)

20. A gold hunting duplex watch, with compensation balance; the case set with diamonds on dark-blue enamel ground, and with brooch and chain to correspond.

21. A ditto, the case set with pearls and diamonds on Maroon enamel ground.

22. A gold hunting lever watch, with compensation balance and independent seconds.

23. A gold open face “blind man’s” watch.

24. A gold hunting duplex watch, with compensation balance, repeating hours and quarters.

25. A ditto, repeating half-quarters.

26. A gold open face observation watch, with double eccentric stop seconds, to register the commencement and termination of an observation without stopping the watch. Eight other keyless watches of different patterns.

WATCHES WINDING WITH A KEY.

27. A gold hunting pocket chronometer.

28. Ditto, open face ditto.

29. A gold hunting lever watch, with compensation balance and brequet pendulum spring. Plain case, with hour circle on cover.

30. A gold open face ditto.

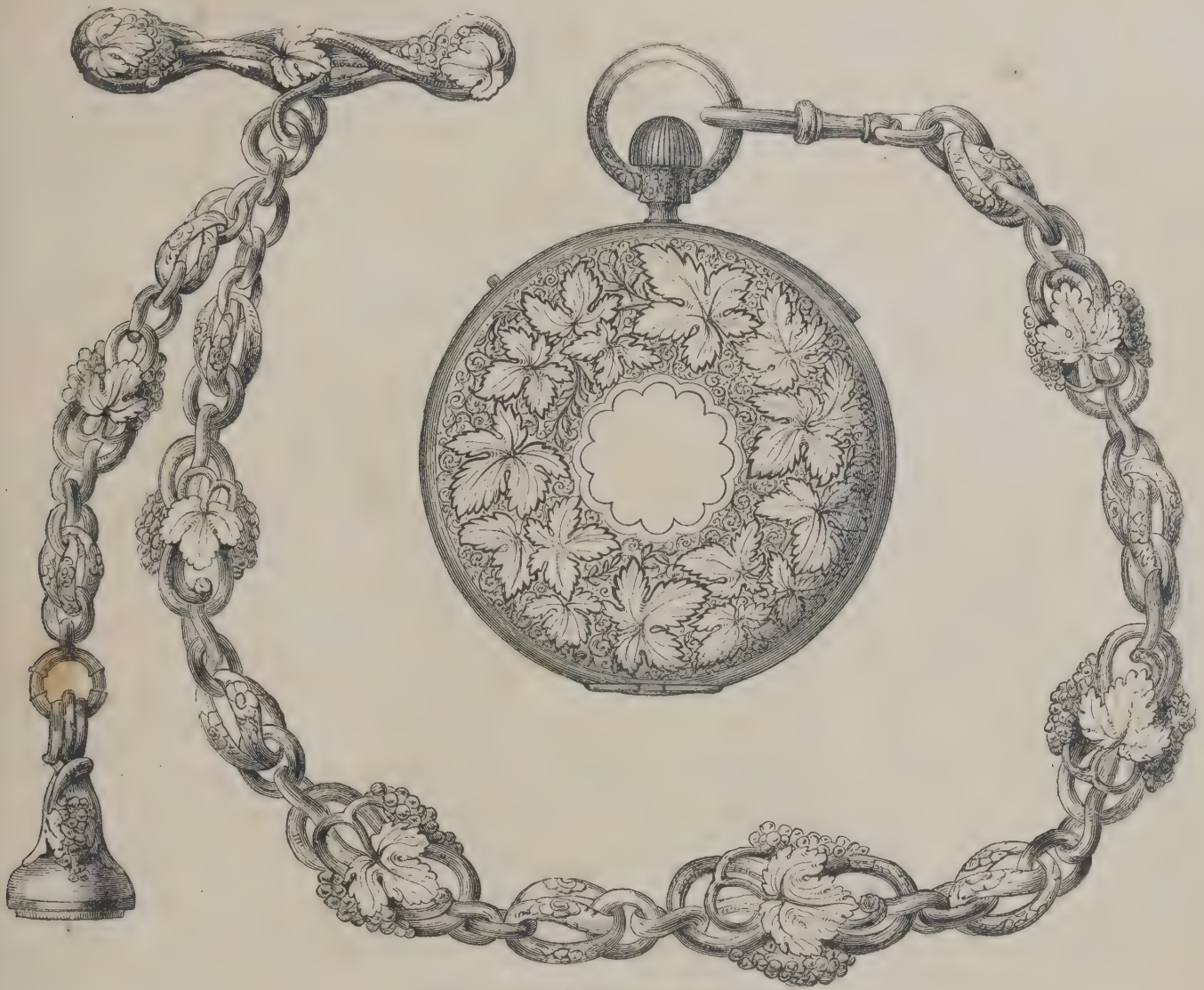
31. A ditto ditto, with double roller escapement.

32. A ditto ditto, with gold balance.

Six ladies’ gold watches, with engraved cases and dials of different patterns.

An assortment of gold Albert and neck chains, with lockets and other pendants.

WHITE, EDWARD—*continued.*



GOLD HUNTING MINUTE REPEATER.



GOLD HUNTING QUARTER REPEATER.

[3318]

VIVIER, O., 21 *Seckforde Street, Clerkenwell*.—Patent fusee keyless watches, with various movements.

[3319]

WALES & M'CULLOCH, 56 *Cheapside, and 32 Ludgate Street*.—Gold and silver watches.

The exhibitors will send post free, on application, an illustrated catalogue of their stock. They can supply | handsome drawing-room clocks, in gilt cases, at 5*l.* 5*s.*, and in variegated marble, at 3*l.* 3*s.*

[3320]

WALKER, JOHN, 68 *Cornhill, and 48 Princes Street, Leicester Square*.—Watches and clocks.

[3321]

WALSH, A. P., 46 *Wilmington Square, Clerkenwell*.—Watches and chronometers.

[3322]

WATKINS, ALEXANDER, 67 *Strand, London*.—Model of the new patent direct action time-keeper; watches, and movements of the same.

[3324]

WEBSTER, RICHARD, 74 *Cornhill*.—Watches, chronometers, keyless watches, centre seconds, repeaters, touch watches, regulators, and railway clocks.

[3325]

WHITE, EDWARD, 20 *Cockspur Street, Pall Mall, S.W.*—Chronometers, watches, clocks, and gold chains. (See pages 82 to 85.)

[3326]

WHITTAKER, RICHARD, 7 *Great Sutton Street, Clerkenwell*.—Improved dome-capped lever watch, combining quality, cheapness, and flatness.

[3327]

WOOD, THOMAS JAMES, 12 *Long Lane, City*.—Black Forest clocks, with brass works, partly English manufacture.

	s.	d.		
1. The International clock price	5	6	Nos. 6 and 7 are exhibited as specimens of ornamenta-	
Exhibited as the smallest cost at which a			tion.	s. d.
really durable and accurate clock has yet			8. An alarum clock price	8 6
been produced.			9. Ditto, large size	14 0
2. A small dial	7	6	10. Double action alarum clock	18 0
3. The school and workshop dial	12	0	11. Alarum clock, striking the hours	14 0
4. Clock to strike the hours	12	0	12. Ditto, large size	18 0
5. Ditto, large size	16	0	Gravity being both the maintaining and regulating	
6. Striking clock, with buhl frame	27	0	power of these clocks, they possess an accuracy of	
7. Ditto, large size	35	0	performance unsurpassed by the most costly produc-	
			tions.	

[3329]

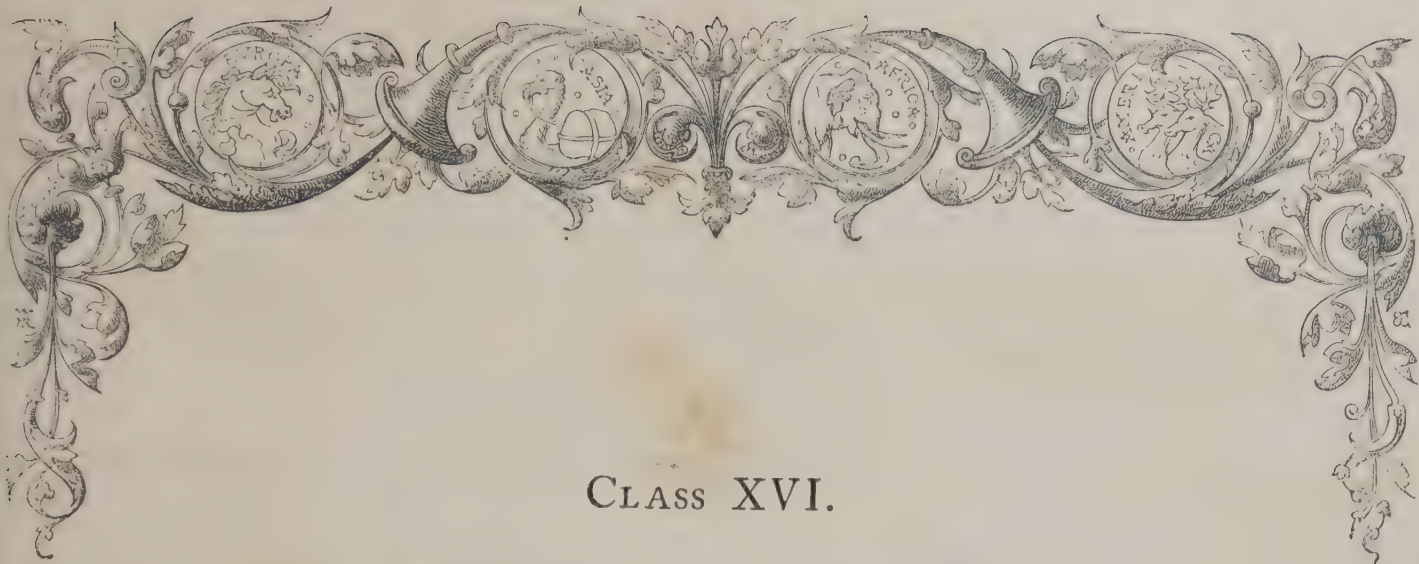
YOUNG, JAMES, *Knaresborough*.—Improvements in the construction of lever watches to save time in repairing, &c.

[3330]

MCLENNAN, J., 6 *Park Place*.—Pocket chronometers.

[3331]

PETIT, S. A., 69 *Princes Street, Leicester Square*.—Regulators, watches, &c.



CLASS XVI.

MUSICAL INSTRUMENTS.

[3360]

ALLISON, RALPH, & SONS, *Wardour Street, W.*—Elegant oak piano, temp. Charles I., and Improved London Model. (See page 88.)

[3361]

ALLWOOD, THOMAS, 16 *Bow Street, Birmingham.*—Six violins and violoncello.

[3362]

BATES & SON, 6 *Ludgate Hill, London, E.C.*—Cottage pianofortes.

A semi-cottage pianoforte in Italian walnut wood case, handsomely carved; compass seven octaves; trichord, treble, &c.

[3363]

BELL, JOSEPH, *Gillygate, York.*—An harmonium with wood reeds and pedals, two octaves; also an instrument containing bassoon, oboe, and clarionet, in the shape of a violoncello, with two rows of keys and wood reeds.

[3364]

BESSON, F., Manufacturer, late of *Paris*, now of 198 *Euston Road, N.W.*—Musical instruments (brass).

Family of *transposition* instruments, enabling the player to perform the most difficult music, and to change instantly from one key to another without once removing the lips from the mouthpiece. The system may be adapted to any three-valve instrument, to which it gives the equality and almost the resources of the violin.

Family of *neoform* instruments—with moveable bells. The main advantage of this model, and which F. BESSON'S [a somewhat similar shape being made by other houses] alone possesses, is that the instruments are perfectly equipped, and accordingly will stand upon their bells; thus rendering them commodious and less liable to injury.

Family of bugles—simple or chromatic at will.

Circular instruments (*passing over the shoulder*), very suitable for cavalry and the field, equipped.

Usual form instruments, with F. BESSON'S latest improvements. New French horns, with and without piston attachment (2 and 3 valves); Koenig horns, pocket saloon cornets, for officers, amateurs, and for presentation. Ophicleides, trombones with double slides (only half the length of the single slide instruments with increased power of tone), new trumpets, chromatic and regulation; duty bugles, &c.

To all the above instruments the pistons *à colonne d'air pleine* may be applied, whereby the wind passages are rendered so perfectly clear and equal that freedom and softness must necessarily follow.

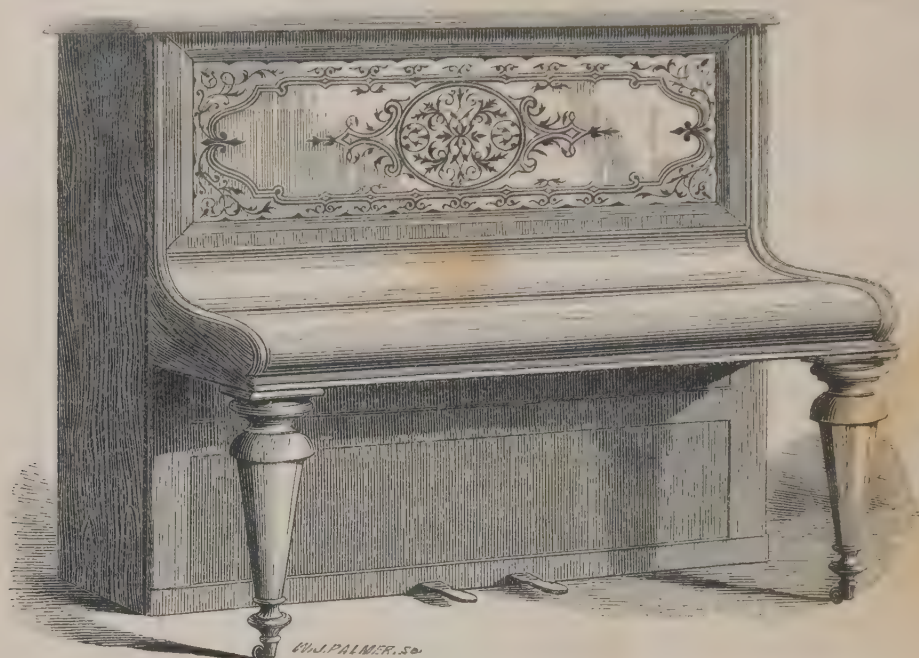
Clarionets, cymbals, side drums; *musical instruments in paper, linen, gutta-percha*, and various other substances,* of perfect tone, tune, and (apparently) metallic vibration.

A *cornet in aluminium*, composed of 105 pieces, each soldered, a feat hitherto deemed impracticable, and in every sense complete. Weight under 12 ounces; that of the brass instrument averages about 36 ounces.

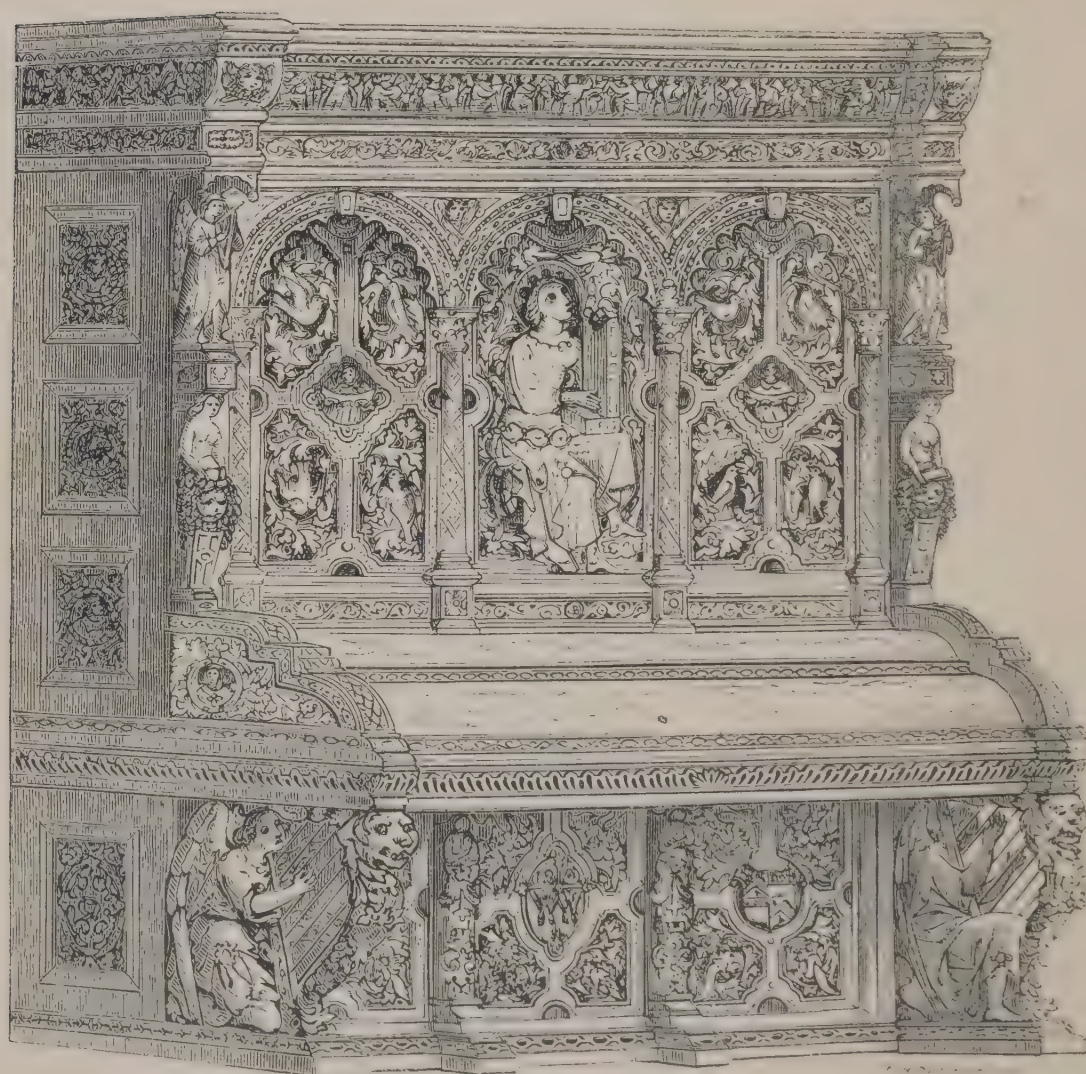
F. BESSON is the possessor of the PROTOTYPE machinery; that is to say, the apparatus by which approved instruments may be repeated in any number with mathematical certainty. Mr. B. devoted ten years' labour exclusively to the perfecting of this machinery, and in his success achieved the greatest desideratum ever sought by the manufacturer and demanded by the patrons of brass musical instruments.

* These are exhibited to prove the all-importance of the proportions and the soundness of the acoustical principles upon which F. BESSON'S instruments are constructed.

ALLISON, RALPH, & SONS, *Wardour Street, W.*—Elegant oak piano, temp. Charles I., and Improved London Model.



ROSEWOOD PIANOFORTE.



The following are exhibited :—

Small rosewood pianoforte, known as the "London Model," suitable for the boudoir or schoolroom : exhibited to show the progress made in the manufacture of pianos by machinery, by the aid of which every part of this little instrument is made.

An elegant oak cottage piano ; style, Charles I. (For detailed description, see handbills.)

An elegant walnut-tree (*Italian wood*) semi-cottage piano.

Warerooms :—108 Wardour Street.

"Steam-power Pianoforte Works,"
Werrington Street, N.W.

[3365]

BETTS, ARTHUR, 27 *Royal Exchange*.—Violins.

[3366]

BEVINGTON & SONS, 48 *Greek Street, and Rose Street, Soho, London*.—An organ, of three manuals and pedals: chancel organ, two, and five stops. (*See page 90.*)

[3367]

BOND, WILLIAM & JOHN, 44 *Norton Street, Liverpool*.—Pianoforte: construction of wrest plank on a new principle.

[3368]

BOOSEY & CHING, 24 *Holles Street, London*.—Six harmoniums—two with pedals, one having self-blowing machine. (*See pages 92 & 93.*)

[3369]

BOOSEY & SONS, 24 *Holles Street, London*.—Military band instruments, reed and brass; Pratten's perfected flutes. (*See pages 94 & 95.*)

[3371]

BRINSMEAD, J., 15 *Charlotte Street, Fitzroy Square*.—Pianos. (*See page 91.*)

[3372]

BROADWOOD, JOHN, & SONS, 33 *Great Pulteney Street, London*.—Four grand pianofortes; also parts and models illustrative of construction.

[3373]

BROOKS, HENRY, & SONS, *London*.—Patent pianoforte hammer-rails, keys, actions, mouldings, fret carvings, &c.

[3374]

BUTLER, GEORGE, *Greek Street, Soho, London*.—Cornets, saxhorns, flutes, and drums.

<p>The following brass band instruments are exhibited: Cornets in seven different models; a full set of saxhorns from soprano to bombardon; bass and side drums; improved military side drums with screws for tuning; circular vibrating horns, including every instrument from the soprano in E ♮ to the bombardon in B ♮, made</p>	<p>in a circular form. These instruments are remarkable for the clearness and brilliancy of tone, caused by there being no impediment to the full passage of the wind. The monster bombardon is made to encircle the body, and to rest on the right shoulder, which is a great assistance in marching or riding.</p>
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[3375]

CADBY, CHARLES, 3, 33, 38, & 39 *Liquorpond Street*.—Pianofortes and harmoniums.

<p>The instruments from these manufactories are well known throughout the United Kingdom and the Colonies for their valuable qualities. Intending purchasers, either</p>	<p>for home use or export trade, can make their selections from a large, well-seasoned, and varied stock in the show-rooms of the exhibitors.</p>
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[3376]

CARD, E. J., 29 *St. James's Street*.—Semi-metallic and metal flutes.

[3377]

CHALLEN, CHARLES, & SON, 3 *Berners Street, Oxford Street*.—Oblique grand and cottage pianofortes.

<p>AN OBLIQUE GRAND PIANOFORTE, in the Louis XVI. style, of walnut, inlaid with box and purple woods, and with ormolu mouldings and enrichments; chased and gilt. Also two GRAND COTTAGE PIANOFORTES, in fine Italian walnut cases, ornamented with simple carvings in the Elizabethan style, and finished internally with patent double actions, which can be regulated to suit a dry or damp climate with the greatest facility.</p>	<p>These exhibitors (whose business has been established nearly sixty years) have not only an English, but a foreign reputation, and are favourably known for the general excellence of their instruments. The examples exhibited will bear the test of comparison with the workmanship of any other makers.</p>
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BEVINGTON & SONS, 48 *Greek Street*, and *Rose Street*, *Soho*, *London*.—An organ, of three manuals and pedals: chancel organs, two and five stops.

Builders of the great organ, Paris Exposition of 1855, which gained the first-class medal for tone and workmanship.

Also of the celebrated organs in the chapel of the Foundling Hospital, the churches of St. Martin's in the

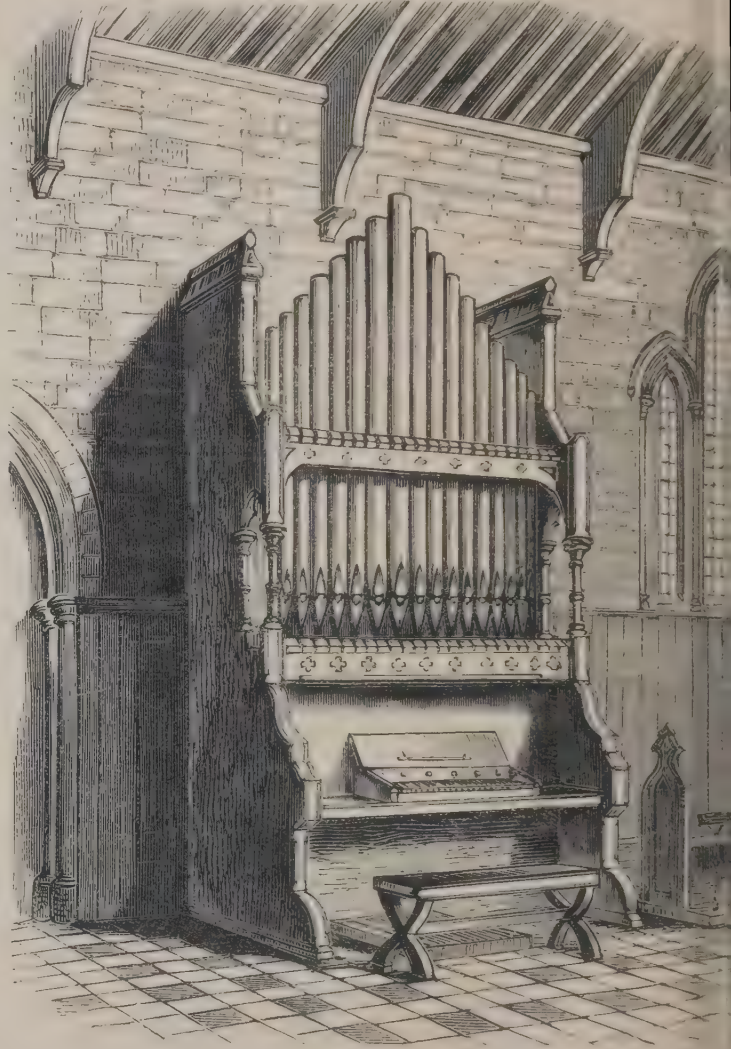
Fields, St. Gabriel's, Pimlico, St. Paul's, Covent Garden, and Dublin Exhibition of 1853.

Exhibitors of the great organ, showing the mechanism, in the Royal Horticultural Garden entrance.

Also of chancel organs, at 35 guineas and 75 guineas, being Nos. 1 and 3 on the annexed list of prices.



CHANCEL ORGAN, NO. 1.



CHANCEL ORGAN, NO. 3.

STOPS.	NO. 1. PRICE 35 GUINEAS.	PIPES.
1. Open diapason, wood bass, CC to C		49
2. Principal, metal, CC to C		49
	Total	98
	NO. 2. PRICE 50 GUINEAS.	
1. Open diapason, metal, G to F		47
2. { Stop diapason } wood, CC to F		54
3. Claribel		54
3. Principal, metal, CC to F		54
	Total	155

Size, 3 feet deep, 5 feet 9 inches wide, 10 feet 6 inches high. Octave of German Pedals.

	NO. 3. PRICE 75 GUINEAS.	PIPES.
1. Bourdon, CCC to CC, 16 feet tone, wood		13
2. Open diapason, metal (G), wood bass, CC to F		54
3. Stop diapason } wood, CC to F		54
4. Claribel		54
5. Dulciana, metal, C to F		42
6. Principal, metal, CC to F		54
	Total	217

Size, 3 feet 8 inches deep, 6 feet 4 inches wide, 11 feet high. Octave of German pedals.

STOPS.	NO. 4. PRICE 100 GUINEAS.	PIPES.
1. Bourdon, CCC to CC, 16 feet tone, wood		13
2. Open diapason, metal (FF), wood bass, CC to F		54
3. Stop diapason } wood, CC to F		54
4. Claribel		54
5. Dulciana, metal, C to F		42
6. Principal, metal, CC to F		54
7. Flute, wood, C to F		42
8. Mixture, metal (12th and 15th), CC to F		108
	Total	367

Size, 4 feet deep, 6 feet 6 inches wide, 12 feet high. Octave of German pedals.

These organs are built of the best material and workmanship; simple in construction, rich and full in tone, and have been designed by Messrs. Bevington to supply a want long felt, viz., a small church organ of architectural character, suitable for any position in the building, with the quality of tone of a large instrument. Barrel attachment, to play eight tunes in absence of organist, 8 guineas.

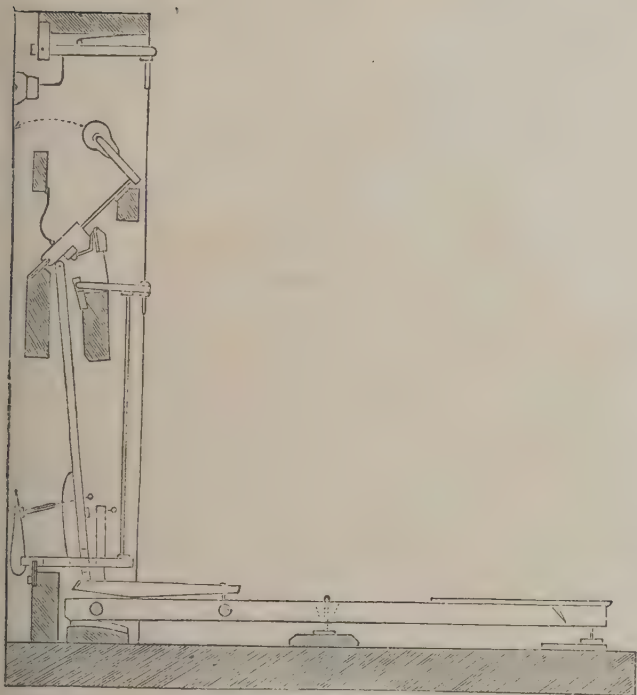
Manufactory, Greek Street, and Rose Street, *Soho*, *London*.

BRINSMEAD, JOHN, 15 *Charlotte Street, Fitzroy Square*.—Pianos.

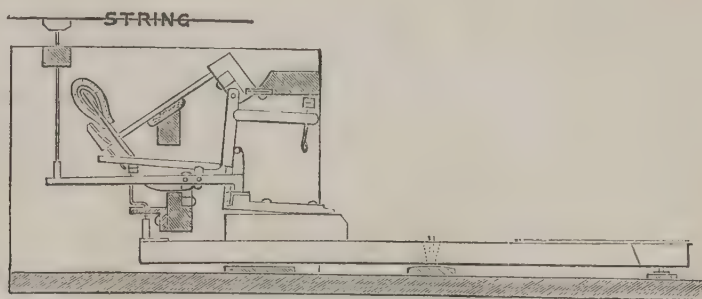
The exhibitor's perfect Check Repeating Grand and Upright Pianos were patented by him February 1862.

The characteristics of this action is its very rapid repeat, the check acting with the slightest movement of the key, an advantage long desired, but until now unat-

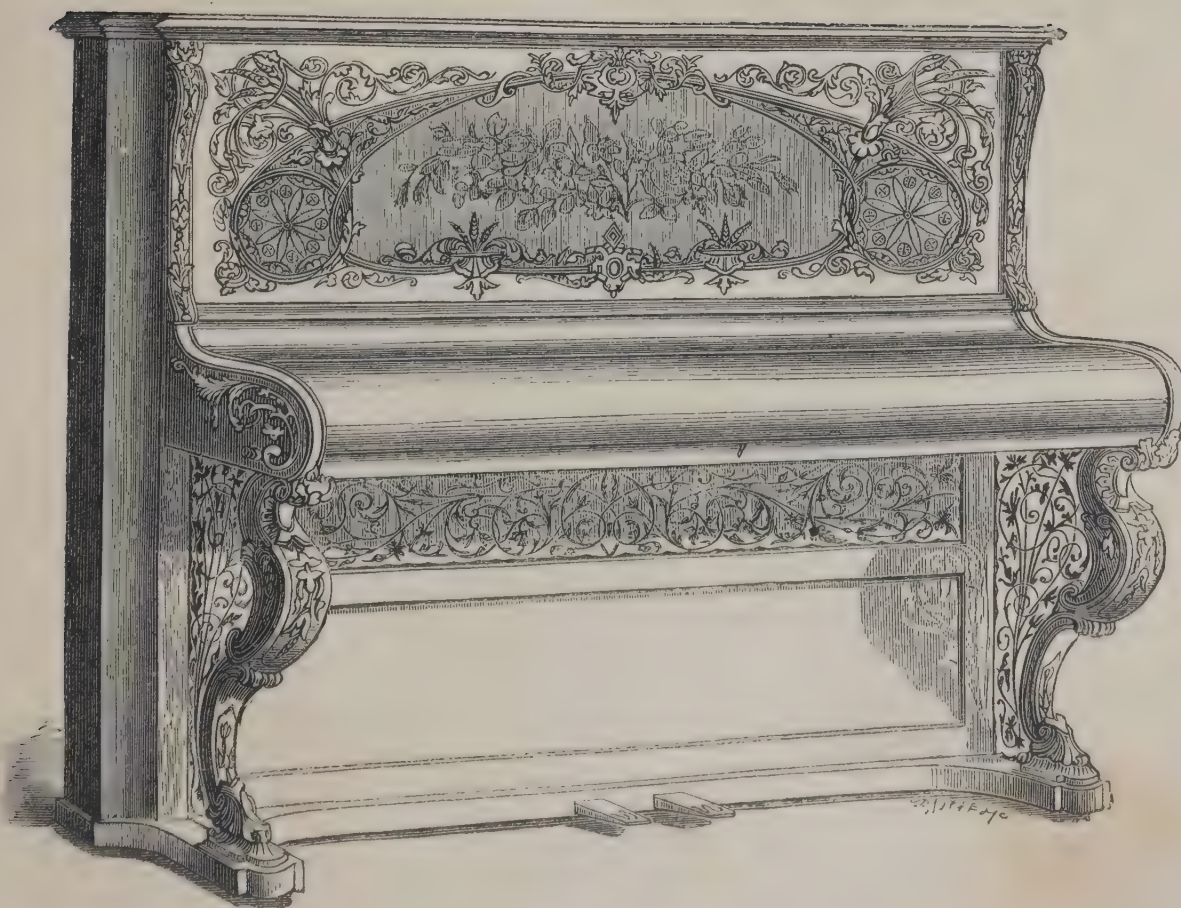
tained ; the simplicity of mechanism renders these pianos most durable. The equally balanced arrangement of metal and wood in the construction of the case particularly adapts them to meet the requirements of extreme climates.



UPRIGHT ACTION.



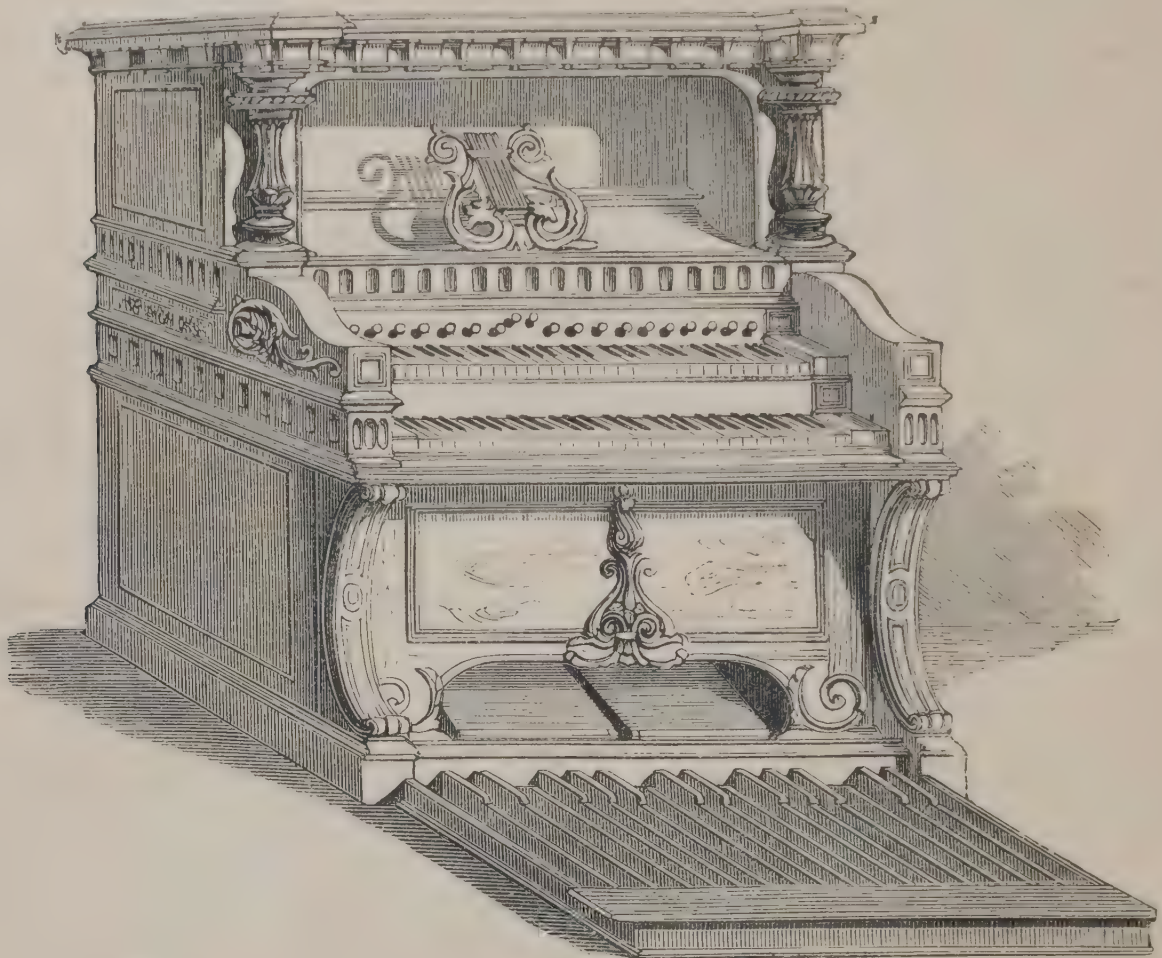
GRAND ACTION.



BRINSMEAD'S PATENT CHECK-REPEATING PIANO.

BOOSEY & CHUNG, 24 *Holles Street, London.*—Six harmoniums; two with pedals, one having self-blowing machine.

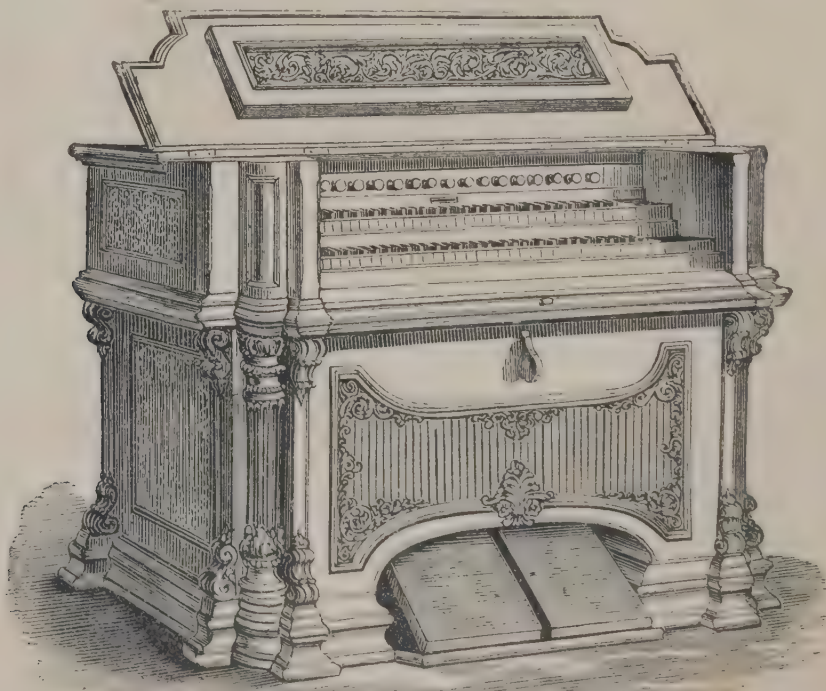
EVANS' ENGLISH HARMONIUMS. No. 1.



No 1.—The above is a drawing of the ORGAN HARMONIUM in a carved oak case, with two rows of keys, and two and a third octaves of pedals, with independent reeds, 32 and 16 feet scales. The upper row of keys repre-

sents the swell, and the lower row the great organ. Couplers from pedal to great, and from swell to great. This instrument has eleven rows of vibrators, and all the attributes of a fine organ.

EVANS' ENGLISH HARMONIUMS. No. 2.



No 2.—This harmonium is in a very elaborate and handsome walnut case, richly carved, with two rows of keys and eight rows of vibrators. Attention is directed to the great resources of this instrument, although it is of such moderate dimensions.

No 3.—This harmonium has a single row of keys and the percussion action. The design and execution of the case of this instrument are worthy of particular attention.

* * The cases of the above instruments are from designs by Mr. Hugh Stanus, of the Sheffield School of Art.

BOOSEY & CHING—*continued.*

No. 4.—Harmonium in an American walnut case, with one row of keys and two and a fourth octaves of pedals. Attached to the seat of this instrument is the new patent self-acting blowing machine. Although many attempts have been made to manufacture a self-acting blowing machine, Boosey and Ching believe that this is the only one of the kind that has ever proved successful.

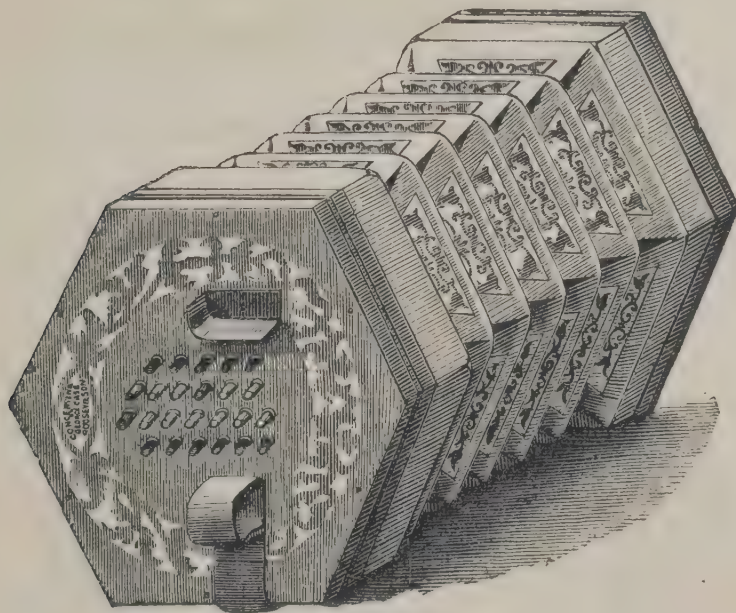
No. 5.—A specimen of the School or ten-guinea Harmonium.

No. 6.—A specimen of the cottage or six-guinea harmonium in a polished pine case. Double pedals and full compass of five octaves.

General remarks about Evans' Harmoniums.

These instruments, first introduced by Mr. Evans in 1843, were brought prominently before the public in 1859, when Messrs. Boosey undertook the full development of the plans Mr. Evans had so successfully designed. Since that period they have rapidly increased in popularity, and have been the means of dissipating the prejudice which formerly existed against the harmonium. Quickness of "speech," flute-like quality of tone, and a great combination of delicacy and power of expression, are some of the characteristics of the English harmonium. Very beautiful effects may be produced by the combination of the harmonium with the pianoforte and chamber stringed instruments, so as to form a miniature orchestra capable of rendering the highest class of chamber music.

CASE'S PATENT CONCERTINAS, Manufactured and Exhibited by BOOSEY & CHING, 24 Holles Street, London.



The universal popularity of the concertina may be ascribed to the many advantages which it possesses over other musical instruments. Its tones are pure, sweet, and brilliant. Its compass is greater than that of the flute, and almost equal to that of the violin. It admits of very great execution and expression. Music written for the pianoforte, violin, flute, or any other instrument, can be performed with equal effect on the concertina. By creating harmonies of any number of parts, it produces a variety of tones and effects only attempted on the pianoforte. The concertina is more easily learnt than any

other instrument. It is compact and portable, and appears to equal advantage in the hands of ladies and gentlemen.

The Concertinas by Case are manufactured by BOOSEY and CHING, under the personal superintendence of Mr. GEORGE CASE, the eminent professor and performer, with the aid of experienced workmen and patent machinery. These instruments will be found to remain well in tune—an important feature peculiar to CASE'S concertinas.

The case exhibited contains specimens of treble, bari-tone, and bass concertinas.

BOOSEY & SONS, Manufacturers of military band instruments, 24 *Holles Street, London.*—
Military band instruments, reed and brass, and Pratten's perfected flutes.

A case of reed and brass instruments containing specimens of the following :—

- An Euphonion or solo bass in B flat, with four rotary cylinders.
- A Bombardon in E flat, with four rotary cylinders.
- An Althorn in B flat, with three ditto ditto.
- A Trumpet in F, ditto ditto.
- A Flugel horn in F, with four rotary cylinders.
- A ditto in B flat, ditto ditto.
- Two Cornet-à-pistons of the new gold metal, one with cylinders and the other with valves.
- A round or rotary model Cornet-à-piston.
- A sterling silver presentation field bugle.
- Several Clarionets in B flat and E flat.



STERLING SILVER CORNET-À-PISTON, WITH ROTARY CYLINDERS AND GILT BELL.

Particular attention is directed to the very superior workmanship displayed in the manufacture of the above instruments.

R. S. PRATTEN'S PERFECTED FLUTES, FIFES, AND PICCOLOS, Manufactured and Exhibited by BOOSEY & SONS,
24 *Holles Street, W.*

The CONCERT FLUTE Number 1A, is the fac-simile of that upon which Mr. Pratten plays at the Royal Italian Opera, musical festivals, &c., and is so constructed that all the keys are within the reach of the fingers whilst in the act of playing. The holes, which are extremely large, and the same size throughout the instrument, are closed with keys regulated to obey the most delicate touch, and can be fingered with perfect ease by the smallest hand, as all unnatural extension of the fingers is avoided. Thus perfect equality is obtained, and the performer can produce the most rapid passages either piano or forte, with the same facility as upon the small-holed flute, and without endangering the intonation. The fingering is the same as that of the old flute, with the addi-

tion of a perfect C \sharp in the two middle octaves, fingered without the aid of the C \sharp key, thus simplifying all the sharp keys where arpeggios are concerned, as also the D \flat in flat keys.

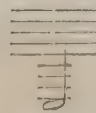
The top octave possesses advantages which facilitate the execution of passages almost insurmountable on other flutes, whilst its peculiarly convenient arrangement of the keys under the fingers renders all shakes perfectly easy to produce, without in the least altering the position of the hand.

Several of the CONCERT FLUTES as well as MILITARY FLUTES and PICCOLOS in E flat and F, and FIFES are also exhibited.

BOOSEY & SONS—*continued.*

MESSRS. BOOSEY AND SONS' BASSO PROFONDO (REGISTERED).

The BASSO PROFONDO, or double slide CONTRA BASSO TROMBONE in B flat; lowest note



The Basso Profondo was first introduced at the Crystal Palace Brass Band contest in July, 1861, and excited the universal admiration of the judges in consequence of the depth and brilliancy of its tone, and the ease with which they were produced. Although bombardons in B flat are occasionally to be met with, their great weight, and the inability of men with ordinary lungs to perform upon them with any satisfaction, have prevented their general adoption. The basso profundo, on the contrary, weighs only eight pounds and a few ounces, and is played with as much ease as an ordinary bass trombone. Boosey and Sons have purchased of the inventor the original instrument, with the sole right of manufacture, and fully expect the basso profundo will in future be an indispensable instrument in every military band. Price, complete with scale and exercises, 14 guineas.

[3378]

CHAPPELL, ARTHUR, 214 *Regent Street*.—Military clarionets, bassoons, flutes, Azemar's silent practice drum, &c.

[3379]

CHAPPELL & Co., 50 *New Bond Street*.—Patent pianofortes and harmoniums, with and without pedals.

[3380]

CHIDLEY, EDWARD, 28 *Store Street, W.C.*—Treble and baritone concertinas.

[3381]

CHIDLEY, ROCK, 135 *High Holborn*.—Harmoniums and concertinas.

[3382]

CLINTON & Co., 35 *Percy Street, Tottenham Court Road*.—Wood and metal flutes of every description.

EQUISONANT FLUTE. This instrument is the only flute equal in tone and tune *throughout*. The system of fingering (which is nearly the same as the ordinary flute) offers unprecedented facilities for every description of passages. Clinton and Co. now manufacture the equisonant, the Boehm, and the eight-keyed flute with the cylindrical bore and parabola head, both in metal and

wood; but having discovered the means of removing the inequalities and objectionable parts of that system, their cylinder flutes will be found far superior to any others ever offered to the public. One trial will prove their superiority. They can be obtained *only* of the patentees and manufacturers, Clinton & Co., 35 Percy Street, Tottenham Court Road. Explanation gratis.

[3383]

COLLARD & COLLARD, 16 *Grosvenor Street, W.*, and 26 *Cheapside, E.C.*—Four pianofortes. (*See pages 98 to 101.*)

[3384]

CONS, F. & F., 81 *John Street, Tottenham Court Road*.—The interior action of a piano.

[3385]

COOK, CHARLES & H. E., *Tavistock Place*.—Pianoforte silk-fronts.

[3386]

CORFE, EDWARD, 28 *Bedford Terrace, Old Ford Road, Victoria Park*.—Musical strings.

[3387]

COXHEAD, CHARLES J., *Castle Street, Shrewsbury*.—Oblique pianoforte, with new patent action.

[3388]

CROGER, THOMAS, 483 *Oxford Street, London, W.C.*—Æolian harps, educational, transposing, metallic harmonicon and metronome, for giving sixty or any number of vibrations in a minute for music, photography, or marching. (*See page 97.*)

[3389]

DAVIS, J. MOIRATO, 40 *Esher Street, Kennington Lane*.—Valves to musical instruments—action inclosed, free from dust.

[3390]

DEARLOVE, MARK WILLIAM, 156 *North Street, Leeds*.—Violins, viola, &c.—own make.

[3391]

DIMOLINE, ABRAHAM, 34 *College Green, Bristol*.—Rosewood cottage pianoforte.

CROGER, THOMAS, 483 Oxford Street, London, W.C.—Æolian harps, educational, transposing, metallic harmonicon and metronome, for giving sixty or any number of vibrations in a minute for music, photography, or marching.



The most delightful effect is obtained by THOMAS CROGER'S NEW PATENT ÆOLIAN HARP, which will produce music in the garden, conservatory, summer-house, on the balcony, or window-ledge, on board any vessel on the water, on the branches of a tree, or "*any other place*," without a performer. It merely requires placing on a table or stand, or laying across the branches of a tree, or it may be suspended from one, or from any convenient place. It does not signify whether it is placed perpendicular, horizontal, or diagonally; the object is to cause the draught to pass through where the strings are, which will set them in vibration, and bring forth the most melodious sounds ever heard, far superior to anything else. At a distance the tones are truly delightful; and what renders it so amusing is, that any one not being aware of its position cannot trace from whence it proceeds; the effect is so peculiar it seems to be in every direction at once. All persons are sure to be surprised and delighted at the romantic effect; it may be used by persons totally unacquainted with music; and will produce an endless source of amusement by its various sounds. Full instruction is attached to each one.

SINGLE HARPS.	12 Strings.	24 Strings.
Plain wood	£0 14 0	£0 18 0
White varnished	0 16 0	1 0 0
Amber varnished, and ornamented with black and crimson lines, best finish	0 18 0	1 2 0
Of Honduras Mahogany French Polished	1 4 0	1 8 0
Of choice Spanish Mahogany Rosewood, Walnut Wood, or Bird's-eye Maple, with a band round the edge, about ½ in. wide, of Zebra-wood or black ebony, beautifully French polished, very chaste, for the drawing-room. . . .	1 10 0	1 14 0

DOUBLE HARPS.	12 Strings.	24 Strings.
Plain wood	1 0 0	1 8 0
White varnished	1 4 0	1 12 0
Amber varnished, and ornamented with black and crimson lines, best finish	1 8 0	1 16 0
Of Honduras Mahogany French polished	1 16 0	2 4 0

	24 Strings.	48 Strings.
Of choice Spanish Mahogany Rosewood, Walnut Wood, or Bird's-eye Maple, with a band round the edge, about 1½ in. wide, of Zebra-wood or black ebony, beautifully French polished, very chaste, for the drawing-room	£ s. d. 2 2 0	£ s. d. 2 10 0

The Double Harps are so contrived that they can be separated, thus forming two Single ones, for two different positions, if required.

All the above harps are 32 in. long, and may be had shorter at the same prices; but if ordered longer, they will be charged extra as follows: those at 14s., 16s., and 18s., 6d. per inch for every inch beyond 32 in.; those at 20s., 22s., and 24s., 9d. per inch. do; those at 28s., 30s., 32s., 34s., and 36s., 1s. per inch do.; and those at 42s., 44s., and 50s., 1s. 3d. per inch do.

THE NEW PATENT EDUCATIONAL TRANSPOSING METALLIC HARMONICON.—The quality of the notes or sound is the same in them all; it is the finish of the case which makes the difference in the price of any one size, for example:—

3 Octaves, with semitones	23s., 30s., 40s., and 84s.
2½ Do.	18s., 25s., 35s., „ 73s. 6d.
2 Do.	14s., 20s., 30s., „ 63s.

WITH A SINGLE ROW OF NOTES.

3 Octaves, 22 notes	12s. and 18s.
2½ „ 19 „	10s. „ 15s.
2 „ 15 „	8s. „ 12s.
1½ „ 12 „	6s. „ 10s.
10 „	5s.
8 „	4s.

Musical instruments and materials of every description of the highest quality on the most advantageous terms.

Notes or vibrators, keys, pipes, stops, &c., for harmonium making or organ building.

THOMAS CROGER'S newly revised, illustrated explanatory price lists, for musical instruments of every description, with testimonials from eminent professors, amateurs, and opinions of the press, should be in the possession of every person as a book of reference, before purchasing anything whatever in the musical business, and which may be had gratis, or post free, from the manufactory as above.

COLLARD & COLLARD, 16 *Grosvenor Street, W.*, and 26 *Cheapside, E.C.*—Pianos.



AN OBLIQUE GRAND PIANOFORTE ON AN EXTENDED SCALE, BY COLLARD AND COLLARD, IN WALNUT WOOD AND GOLD, IN THE LOUIS SEIZE STYLE.

The following PIANOFORTES and MODELS OF ACTIONS are exhibited by COLLARD & COLLARD:—

1.—A CONCERT GRAND PIANOFORTE of 7 octaves, A to A, with patent repetition action, in very choice walnut-wood case, with carved enrichments in the *renaissance style*.

2.—AN ELEGANT CONCERT GRAND PIANOFORTE of 7 octaves, A to A, with patent repetition action, in very choice rosewood case, with massive carved cabriole trusses.

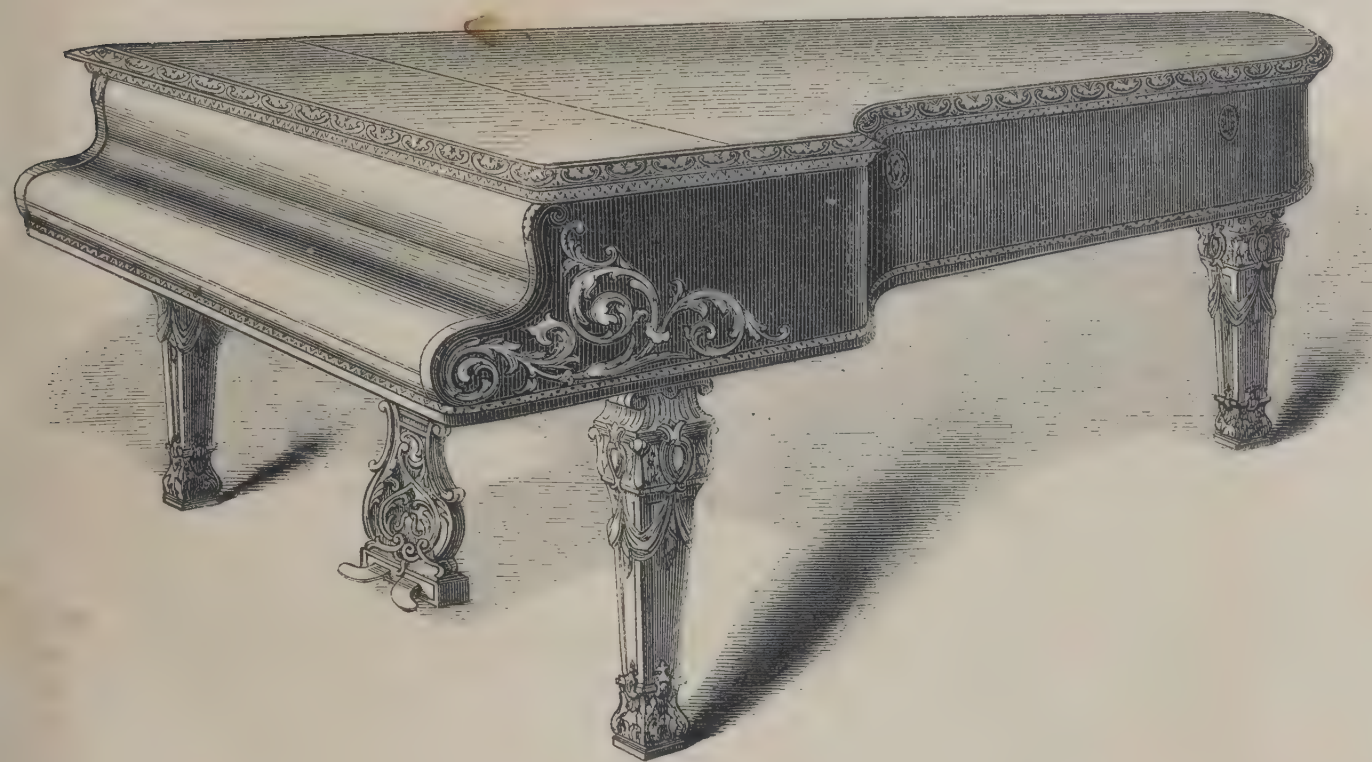
* * The attention of the connoisseur is particularly directed to the mechanism of these instruments, as showing fewer centres of friction, and greater simplicity of contrivance than in any other Grand action, whereby greater durability is secured, and the operation of regulating is considerably facilitated. The power of blow in the hammer is also increased, and the delicacy of touch

and unfailing promptness of repetition, so essential for the requirements of the modern school of Pianoforte playing, are secured to an extent to satisfy the most fastidious finger.

3.—AN OBLIQUE GRAND PIANOFORTE of $6\frac{3}{4}$ octaves, C to A, with patent escapement and repetition action, in satin-wood case, with carved and gilt decorations in the *Italian style*.

4.—AN OBLIQUE GRAND PIANOFORTE, on extended scale, of $6\frac{7}{8}$ octaves, C to A, with patent escapement and repetition action, in very choice walnut-wood case, with carved and gilt enrichments in the *Louis Seize style*.

* * The Oblique Grand Pianoforte (of which Nos. 3 and 4 are very unique specimens) is an instrument of comparatively recent introduction. The application of Collard and Collard's well-known and important improvements in upright pianofortes have tended in no

COLLARD & COLLARD—*continued.*

A WALNUT WOOD CONCERT GRAND PIANOFORTE BY COLLARD AND COLLARD, IN THE RENAISSANCE STYLE.

small degree to strengthen the favourable judgment which musical connoisseurs and the fashionable world have bestowed on them. Convenient and elegant in form, and effective in the highest degree, both as regard power of tone and perfection of touch, these charming instruments are found to be, for rooms of limited size, the most effective substitute for the full Grand Pianoforte, to which, in character of tone, they closely approximate.

The mechanism of these Pianofortes is exemplified by Model No. 3.

5.—A SOLID WOOD SPANISH MAHOGANY SQUARE SEMI-GRAND PIANOFORTE of $6\frac{1}{2}$ octaves, C to A, with patent repetition action and transverse bass strings, as manufactured by Collard and Collard expressly for the East Indies and tropical climates.

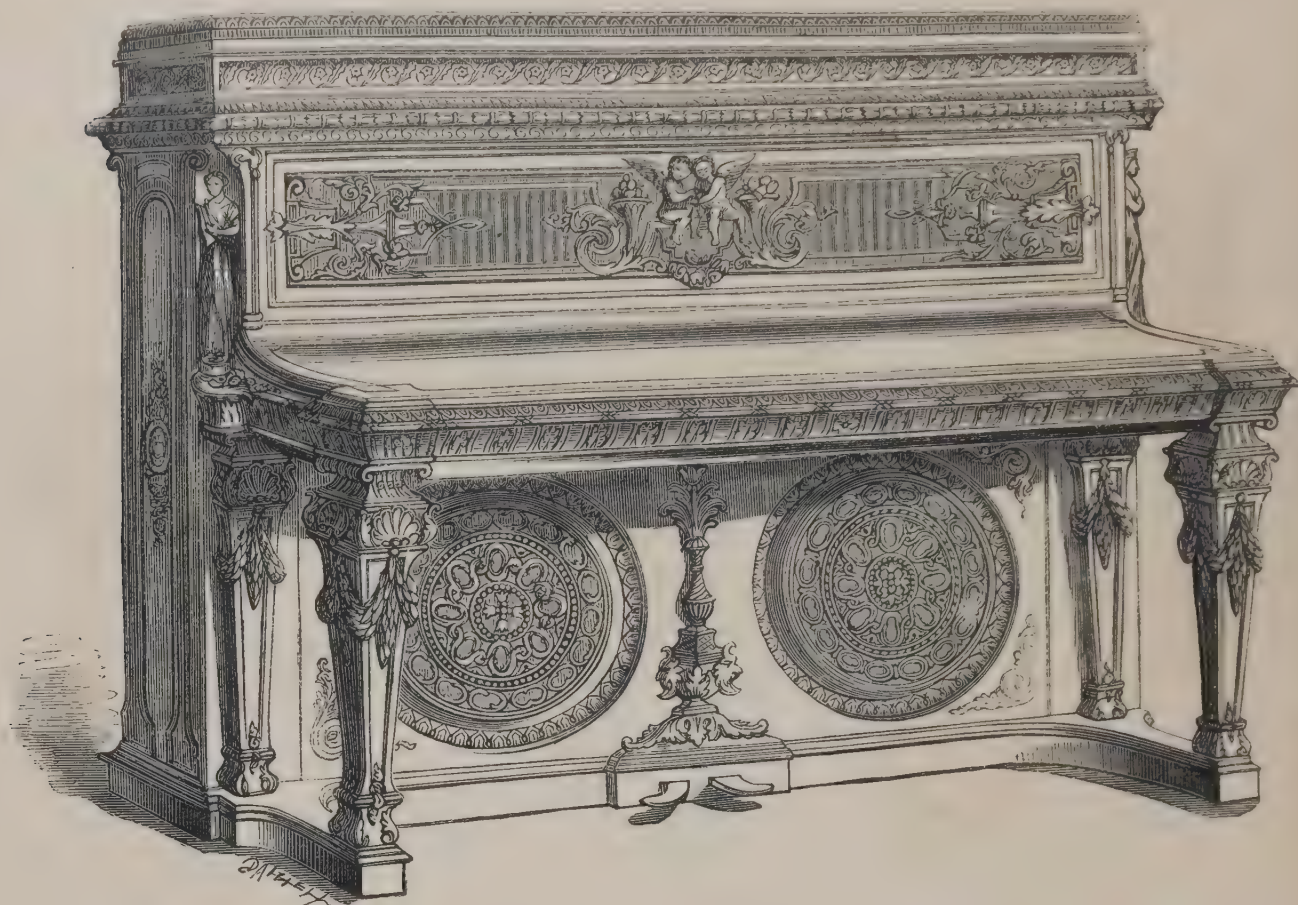
*** The principle of construction of this pianoforte differs in a striking degree from that of the ordinary Grand and Square. The object sought to be attained is the

greatest power of resisting the destructive influence of East Indian and tropical climates, without the usual reliance on the adhesive properties of glue. This result has been most successfully accomplished, and the experience of several years has proved that under the most trying ordeals, these instruments have satisfactorily stood the test;—public opinion in India having awarded them the highest praise.

The principle of the action is illustrated by the model No. 2.

6.—A PIANINO, or SMALL COTTAGE PIANOFORTE, in plain rosewood case, of $6\frac{1}{2}$ octaves, C to A, O G fall; fret-work front and octagon legs.

*** This instrument is an example of the cheapest upright instrument manufactured by Messrs. COLLARD & COLLARD. Such is the popularity of these instruments that, during periods of active trade, the yearly demand reaches the large number of nearly 2000.

COLLARD & COLLARD—*continued.*

AN OBLIQUE GRAND PIANOFORTE BY COLLARD AND COLLARD, IN SATINWOOD AND GOLD, IN THE ITALIAN STYLE.

LIST OF MODELS.

- No. 1.—The action of the Concert Grand Pianoforte.
 No. 2.—The action of the New Square Semi-Grand Pianoforte.
 No. 3.—The action of the Oblique Grand Pianoforte.
 No. 4.—The action of the Cottage Pianoforte.
 No. 5.—The Model of a Cottage Pianoforte, in two divisions, and extensively manufactured for the South American market. The weight of the instrument being equally divided and brought within the limit of a mule's burthen, its transport over the Andes (otherwise impossible) is thus rendered of easy accomplishment. The parts are readjusted without the smallest difficulty, and the instrument in no respect suffers from its temporary disjointment.

Dates and particulars of Patents, Registrations, &c., assigned to MESSRS. COLLARD & COLLARD, London.

1827.—*March 2nd.*

For "certain improvements in pianofortes, and in the mode of stringing the same;" viz., an application of the

check action to the square pianoforte, thenceforward called the grand square; and a new mode of stringing,* adapted to instruments of all kinds by passing the wire round a single pin,—thus superseding the use of the noose or eye before in general use: also for a new arrangement of the damper, known as the elongated damper-head, by which the jarring consequent on the old method was entirely prevented, and more effectual damping secured.

1829—*November 2nd.*

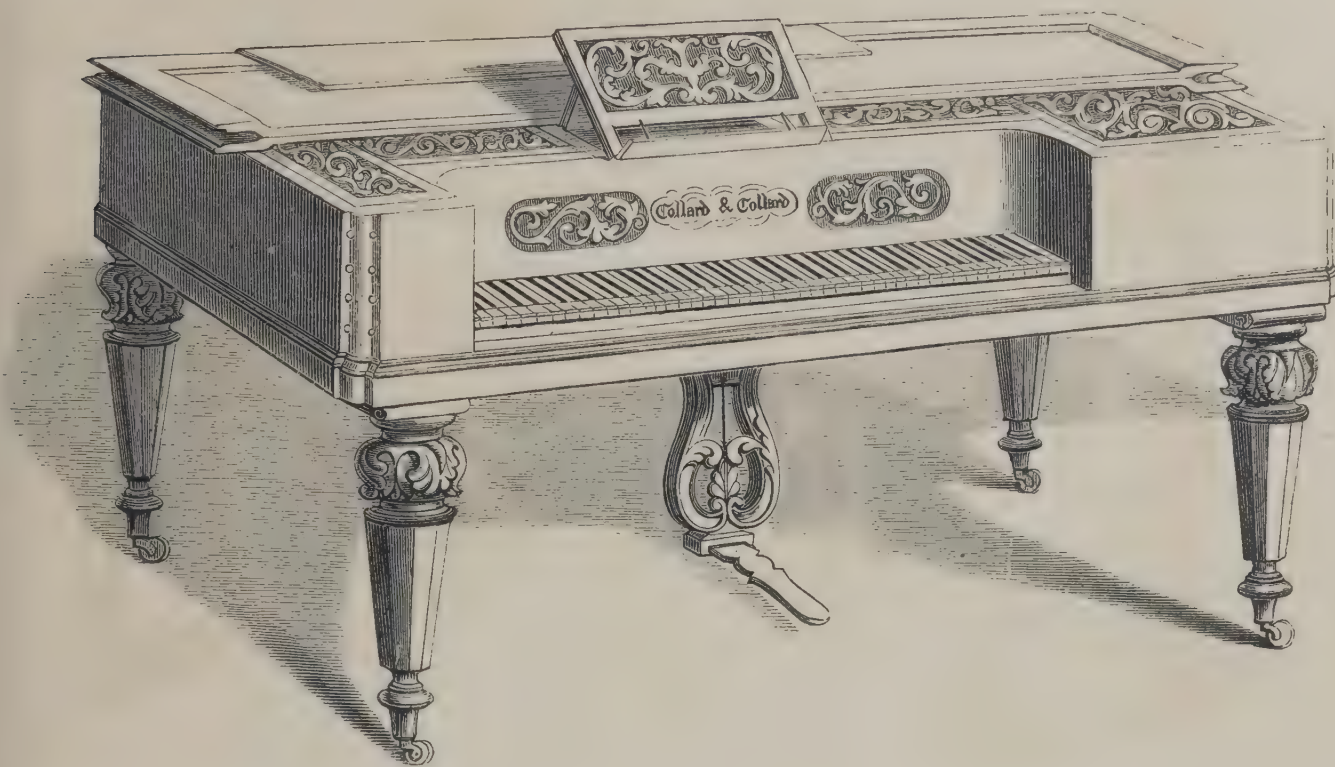
For "improvement in upright pianofortes," viz., applying a check to the under hammer to prevent the rebound of the hammer against the string.

1835—*January 15th.*

"For improvements in the mechanism of horizontal grand and square pianofortes," consisting of an entirely new construction of the action, the escapement being placed upon the key and coming in contact with a lever or crank, and thus regulating the rise and fall of the hammer, thereby imparting greater vigour to the blow and increased durability to the touch.

* This mode of stringing has become almost universal since the expiration of the patent.

COLLARD & COLLARD—*continued.*



A SOLID WOOD MAHOGANY SQUARE SEMI-GRAND PIANOFORTE, MANUFACTURED EXPRESSLY FOR THE EAST INDIES,
BY COLLARD AND COLLARD.

List of Patents, &c.—continued.

1838—*January 1st.*

The introduction of a new class of square pianoforte, entitled the “patent square semi-grand pianoforte,” being a further improvement of the grand square, by which a closer approximation to the peculiarities of the grand pianoforte was attained.

1841—*November 11th.*

For “certain further improvements in the action of horizontal pianofortes,” consisting of the introduction of the traversing escapement fixed upon the hammer rail, resulting in a greater amount of precision and increased vigour of action, as also the introduction of a repetition movement.

1843—*April 29th.*

For “further improvement in the action of pianofortes,” viz., the application of the repetition movement to square and to vertical or upright instruments.

1844—*January.*

For the construction of a cottage pianoforte in two divisions, for the purpose of facilitating transport on the

backs of mules in the mountainous districts of Central America, otherwise inaccessible by reason of weight.

1847—*October 15th.*

Registered. A new design for the shape of a square pianoforte, entitled the “symmetrical grand square,” by which greater beauty of form was secured. The key-board being placed in the centre of the instrument, thus obviating the inelegant appearance of the old instruments.

1855—*May.*

Registered. “An improved key-board,” the ends of the sharps being rounded for the purpose of giving to the performer increased facility for rapid execution, and imparting to the key-board a more pleasing appearance.

1857—*February.*

Patented. “Further improvement in the action of vertical pianofortes,” having for its object to add increased vigour to the blow of the hammer, giving to the performer the power of a more prompt repetition, and imparting increased durability to the touch.

[3392]
 DISTIN, HENRY, 9 & 10 *Great Newport Street, St. Martin's Lane.*—Military musical instruments of every description.



INTERIOR OF HENRY DISTIN AND CO.'S MUSICAL INSTRUMENT MANUFACTORY.

The exhibitors are manufacturers of musical instruments to Her Majesty's army and navy, the forces in

India, volunteer corps, and the Royal and Imperial Italian Operas of London and St. Petersburg.

Persons interested in the manufacture of musical instruments are invited to visit the above factory.

[3393]
 DODD, JAMES, *Image Cottage, Holloway Road, Islington, N.*—Violin, tenor ; violoncello bows ; silvered music-strings ; specimen of workmanship.

[3394]
 DUFF, HODGSON, & Co. (late Towns), 20 *Oxford Street.*—Pianofortes.

The exhibitors beg to call the attention of the musical world and the public to the excellence of the improved pianofortes made by them ; specimens of which may now be seen at the International Exhibition, where they have met with the unqualified approbation of some of our most distinguished pianists. These instruments, for quality and quantity of tone, delicacy of touch, and durability of construction, cannot be surpassed. They have been exported to the most trying and extreme climates, and have been found superior to most others.

The following is a descriptive and priced list of those most in demand :—

No. 1. Solid walnut or mahogany boudoir, full compass	30 guineas.
2. Elegant rosewood or zebra wood boudoir	38 "
3. In French walnut (of great beauty).	42 "
4. Ditto, extra elegant	45 "
5. Ditto, with carved scroll legs and plinth	50 "
6. Trichord rosewood cottage, ditto	55 "
7. Ditto, walnut cottage, ditto	60 "
8. Rosewood cottage	45 "
9. French walnut cottage	50 "

[3395]
 EAVESTAFF, WILLIAM, 17 *Sloane Street.*—A trichord walnut-wood pianoforte, seven octaves.

[3396]
 EAVESTAFF, WILLIAM GLEN, 60 *Great Russell Street, Bloomsbury.*—Pianoforte.

[3397]

FINCHAM, JOHN, 110 *Euston Road, London*.—Six stops of organ-metal pipes shown in a skeleton organ.

[3398]

FORSTER & ANDREWS, *Hull*.—A grand church organ and a model chancel organ. (*See page 104.*)

[3399]

FRENCH, JAMES MARTIN, 67 *Bull Street, Birmingham*.—Cottage grand pianoforte, with tubular braced back.

[3400]

GEARY, JOHN, *Prince of Wales Road, Kentish Town*.—A rosewood truss piccolo pianoforte; a walnut truss semi-cottage pianoforte.

[3401]

GLASSBARROW, C., 104 *Great Russell Street*.—New and improved piano.

[3402]

GLEN, THOMAS, 2 *North Bank Street, Edinburgh*.—Highland regimental bagpipes in metal, made expressly for tropical climates.

[3403]

GREAVES, EDWARD, 76 *Milton Street, Sheffield*.—Æolian pitch-pipes, tuning-forks and hammers, chromatic tuning-forks, portable metronomes, &c.

[3404]

GREINER & SANDILANDS, 1 *Golden Square, London*.—Boudoir, grand, and cottage pianofortes, with patented choir tuning.

[3405]

HAMPTON, CHARLES, 31 *Charlotte Street, Fitzroy Square*.—Improvements in the construction of first-class pianofortes. (*See page 105.*)

[3406]

HARRISON, JOSEPH, & Co., 65 *John Street, Fitzroy Square, London, W.*—A pianoforte with patent iron clipper plates and gilt steel wire, that will not rust.

[3407]

HIGHAM, JOSEPH, *Victoria Bridge, Manchester*.—Brass musical instruments.

[3408]

HILL, WILLIAM EBSWORTH, 192 *Waterloo Bridge Road, London*.—Gold and silver-mounted violin, &c.; bows, viola, and a violin.

[3409]

HOLDERNESSE, W., 444 *Oxford Street, London, W.C.*—A cottage pianoforte in an elegant walnut-tree case.

[3410]

HOLMAN, J. & E., 43 *London Street, Fitzroy Square*.—Patent model action of piano.

[3411]

HOPKINS, THOMAS M., *Worcester*.—Double bass, with apparatus attached, for producing enharmonic scales of harmonics.

FORSTER & ANDREWS, *Hull*.—A grand church organ and a model chancel organ.

GREAT ORGAN CC to G.

1.—Double open diapason	16 feet	...	56 pipes.
2.—Open diapason	8	"	56 "
3.—Gamba	8	"	56 "
4.—Hohlflöte	8	"	56 "
5.—Stopt diapason	8	"	56 "
6.—Principal	4	"	56 "
7.—Waldflöte	4	"	56 "
8.—Twelfth and fifteenth	3 & 2	"	112 "
9.—Mixture	...	...	280 "
10.—Posaune	8	"	56 "
11.—Trumpet	8	"	56 "
12.—Clarion	4	"	56 "
			952 "

PEDAL ORGAN CCC to F.

1.—Open diapason bass	16 feet	...	30 pipes.
2.—Stopt diapason bass	16	"	30 "
3.—Principal bass	8	"	30 "
4.—Stopt flute bass	8	"	30 "
5.—Trombone bass	16	"	30 "
6.—Pedal organ in octaves	16	"	60 "
			210 "

SWELLING ORGAN CC to G.

1.—Bourbon	16 feet	...	56 pipes.
2.—Open diapason	8	"	56 "
3.—Bell gamba	8	"	56 "
4.—Stopt diapason	8	"	56 "
5.—Principal	4	"	56 "
6.—Flauto traverso	4	"	56 "
7.—Mixture	...	...	280 "
8.—Double trumpet	16	"	44 "
9.—Cornopean	8	"	56 "
10.—Hautboy	8	"	56 "
11.—Clarion	4	"	56 "
			828 "

CHOIR ORGAN CC to G.

1.—Lieblich gedact	16 feet	...	56 pipes.
2.—Dulciana	8	"	56 "
3.—Stopt diapason	8	"	56 "
4.—Spitzflöte	4	"	56 "
5.—Dulcet flute	4	"	56 "
6.—Gemshorn	2	"	56 "
7.—Harmonic piccolo	2	"	56 "
8.—Clarinet	8	"	37 "
9.—Grand ophicleide	8	"	56 "
			485 "

ACCESSORY MOVEMENTS AND COUPLETS.

- 1.—Great to pedals.
- 2.—Swell to pedals.
- 3.—Choir to pedals.
- 4.—Swell to great.
- 5.—Choir to great.
- 6.—Swell to choir.
- 7.—Sforzando pedal No. 1.
- 8.—Sforzando pedal No. 2.
- 9.—Tremulant to swell.
- 10.—Combination pedal.
- 11, 12, 13, 14, 15 & 16.—Composition pedals.

REMARKS.

The whole of the accessory movements are labelled similar to the registers. Sforzando pedal No. 1 couples the great organ to the swell. Sforzando pedal No. 2 couples the pedal organ to the great. When this pedal is down and the various couplets drawn, the full power of the instrument is concentrated on the great organ and pedals, and although forty-six pipes speak for each key pressed down, and fifty-one for each pedal, the touch remains the same as for a single pipe. The patent pneumatic combination pedal acts simultaneously on the stops in the various organs, producing eight different combinations from one pedal. INTERIOR OF ORGAN. The movements are principally direct action. Improved pneumatic movements are applied to the great and pedal organs, which also act on the whole of the couplets. The bellows are blown by Joy's patent hydraulic engines, supplying wind at four different pressures. The scales of the pipes have been arranged by Professor Töpfer of Weimar, on the proportion of 1 : $\sqrt{8}$. The wood pipes from four feet C upwards are of Swiss pine. The large pedal open diapason, and the 16-foot metal double diapason have conical valves under feet. This valve was introduced by F. & A. in 1850. The organ is tuned equal temperament, and the pitch is for C, 528 vibrations in a second. The registers are arranged at an angle of 45° (first introduced by F. & A. in 1850). The pedal keys are concave and radiating. The total number of pipes is 2,475, and of registers 45.

MODEL CHANCEL ORGAN, containing—

1.—Open diapason	...	...	56 pipes.
2.—Stopt diapason	...	...	56 "
3.—Principal	...	...	56 "
4.—Octave couplet	...	...	36 "
			204 "

[Oak frame, illuminated pipes.

HAMPTON, CHARLES, 31 *Charlotte Street, Fitzroy Square, London.*—Improvements in the construction of first-class pianofortes.

Height, 4 ft. 2 in. ; Width, 4 ft. 6 in.



No. 6.—THREE UNISONS ; SEVEN OCTAVES ; IVORY BRIDGE. PRICE 35 GUINEAS.

The principle upon which these pianofortes are made, absolutely prevents settling in the groundwork of the instrument, the long-sought desideratum.—See “*Hunt’s Handbook.*” It also improves the tone, renders the necessity for tuning less frequent, and the pianoforte much more durable.

C. Hampton’s Cottage Pianofortes are warranted to stand in tune in any climate, and are especially adapted for exportation at prices varying from 20 to 50 guineas.

C. H. begs respectfully to thank those who have so kindly given him their support from his commencement in ’51, and to invite the critical attention of the scientific world to his invention of 1860, called “*The Double Tension or Compressed Principle,*” as shown in the glass case No. 7 : it will be observed that the “back,” or groundwork of the instrument is simply suspended in and otherwise entirely independent of the glass case. The object being to show the construction of the back, and the time and method of applying the compression referred to.

The three tension rods or bars remaining have each a ton pressure on them ; three other bars have been applied in the same direction and at the same tension in the treble part of the instrument from its commencement, till it was strung and tuned ; hence it follows that six tons pressure has been equally distributed over the piano in the same direction as the strings, before the strings were applied, or even the sounding-board was fixed in its place ; it must be evident, therefore, that the shrinking or settling of the groundwork by the pull of the strings,

which do not exceed five tons, is obviated by the application of this principle.

These pianos are especially adapted for exportation, or exposed situations, for three reasons :—

1st. They are compensating in principle, and will not rise and fall in pitch with the alternations of temperature ; the iron tubes being of the same length and in the same direction as the steel strings contract and expand in the same ratio.

2ndly. The whole of the internal mechanism having been manufactured on the premises for the last eleven years, is warranted first-class, and

3rdly. The veneering being laid in cement instead of glue, will bear an immense amount of heat or damp before it will strip from the underwood. Upwards of 300 on this principle have been sent out, and not a single complaint has been made against them.

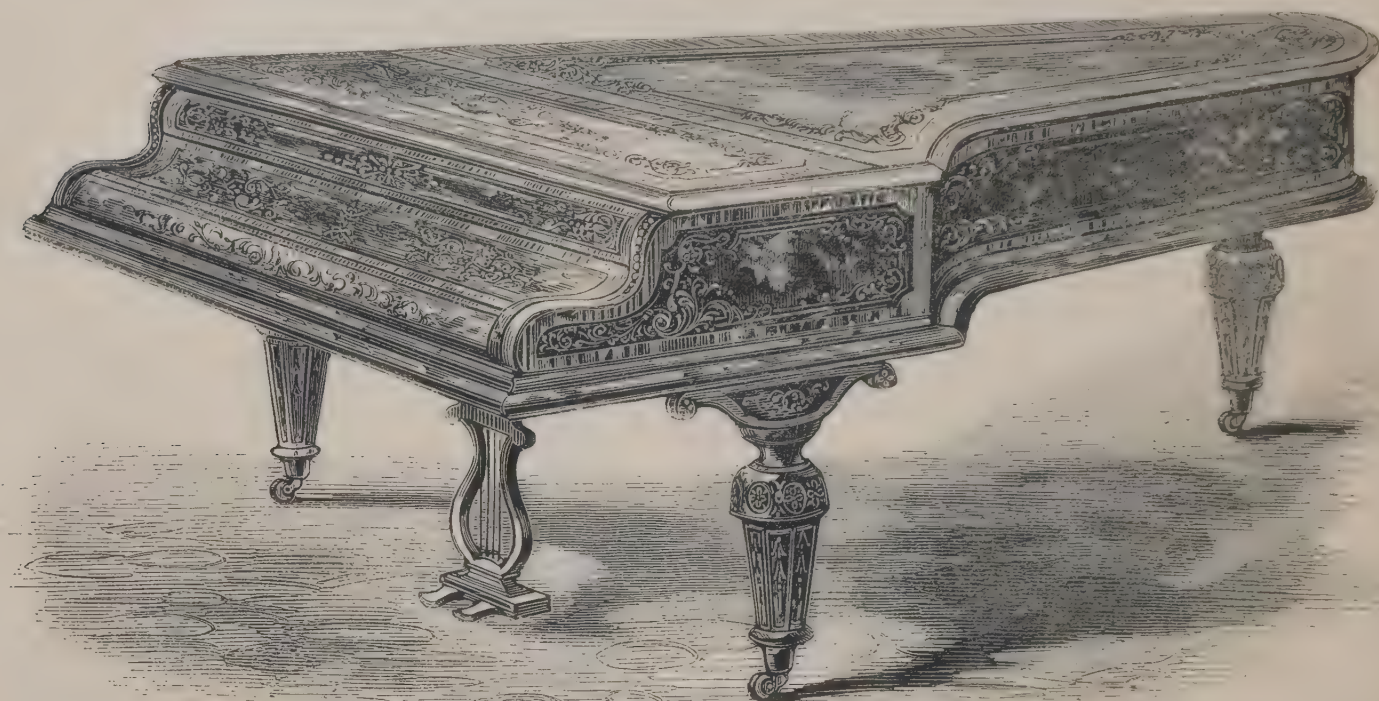
In answer to those who think that metal should not be used in the construction of cottage pianos, C. H. begs to draw attention to the fact that our most eminent makers have hitherto taken the best prizes for grands which have contained the greatest quantity of metal in their construction ; and respectfully states that his constant endeavour is to assimilate the cottage to the grand, both in its construction and tone, and leaves the public to judge how far he has succeeded.

C. Hampton’s pianofortes may be purchased through any music-seller, at the same price as at the factory ; but if purchased direct they will be packed and sent free to the nearest railway station in any part of England, and a warranty of three years given with each instrument.

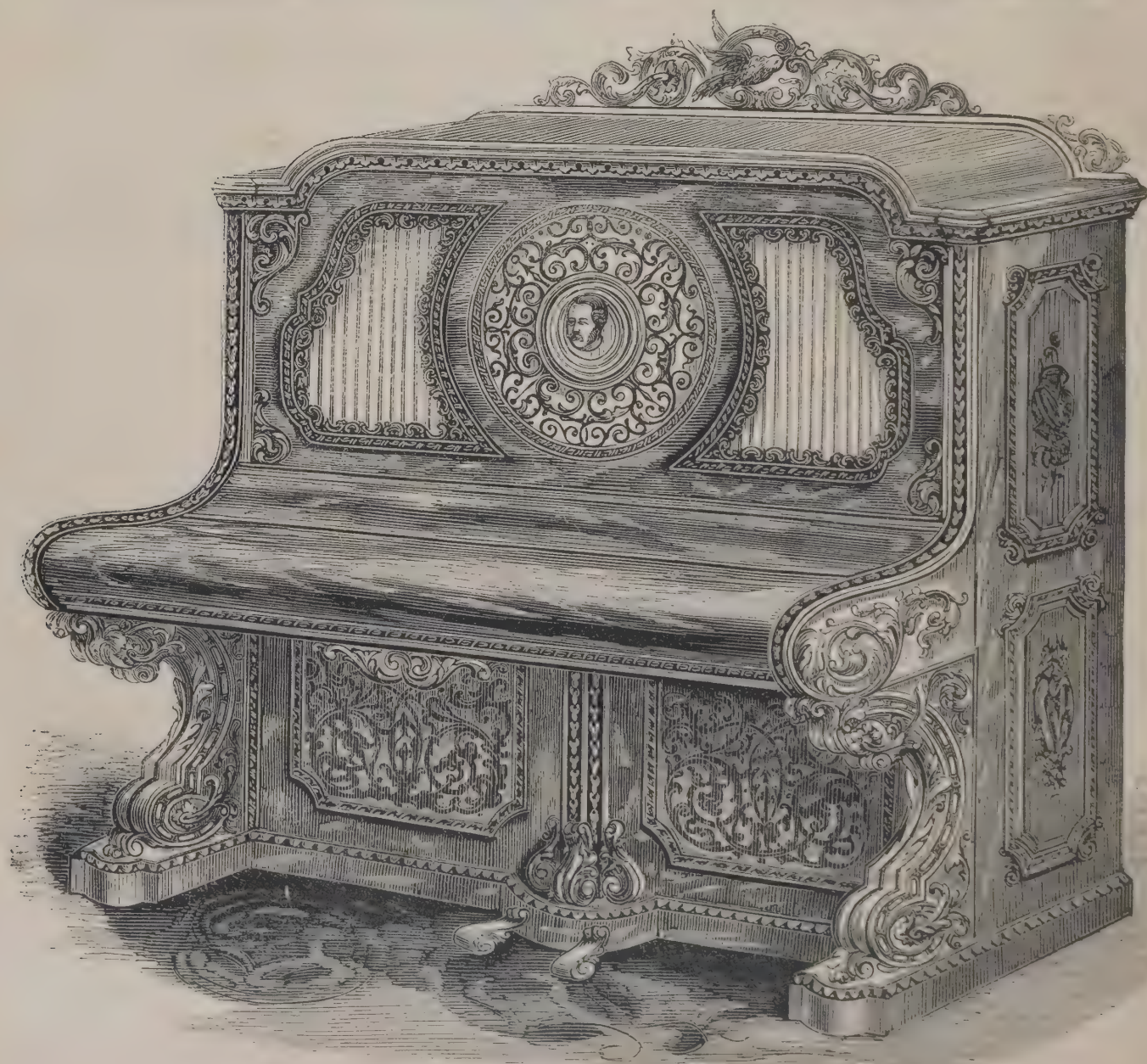
[3412]

HOPKINSON, JOHN & JAMES, 235 *Regent Street, London.*—Patent grand and cottage pianofortes and models.

[*Obtained First Class Prize Medals at the Exhibitions of 1851 and 1855.*]



PATENT CONCERT GRAND PIANOFORTE. WALNUT, INLAID WITH IVORY, TULIP, BOX, AND KING WOODS.



COTTAGE GRAND PIANOFORTE, WITH CARVINGS IN THE ITALIAN STYLE,

[3413]

HUGHES, W., & Co., 148 *Drury Lane*.—Covered strings for pianofortes; copper and other music wires.

[3414]

IMHOF & MUKLE, 54 *Oxford Street*.—Orchestrion, or self-acting organ. (*See page 108.*)

[3415]

IVORY & PRANGLEY, 275 *Euston Road, London*.—Semi-cottage pianoforte with patent grand action and keys.

[3416]

JACKSON & PAINE, *Store Street, London, W.C.*—Patentee of the anti-blocking hopper for cottage-pianofortes.

[3417]

KIND, CARL, 50 *George's Grove, Holloway, N.*—Model of a grand pianoforte action, new invention—patented.

[3418]

KIRKMAN, JOSEPH, & SON, 3 *Soho Square*.—Pianofortes. (*See pages 109 to 111.*)

[3419]

KNOLL, CHARLES, & Co., 187 *Tottenham Court Road, W.*—Grand pianofortes; oblique grand, and cottage.

[3420]

KÖHLER, JOHN, 35 *Henrietta Street, Covent Garden*.—Brass musical instruments of every kind for military bands.

[*Obtained Prize Medal at the Exhibition of 1851.*]

The following new inventions and modifications will be found among the instruments exhibited by Mr. KÖHLER.

1. THE PATENT HARMONIC CORNOPEAN, introducing a fourth valve, by means of which an instantaneous echo can be produced.

2. The addition of a double slide to the "Harper's

Slide Trumpet" rendering the chromatic scale of that instrument perfect in the *lower* as well as in the upper notes.

3. An invention to substitute the water-key in all brass instruments, preserving a perfectly level surface in the wind passage, and facilitating the discharge of the accumulated water.

[3421]

LACHENEL, LOUIS, 8 *Little James Street, Bedford Row, W.C.*—Manufacturer of English patent concertinas. (*See page 112.*)

[3422]

LOCKE, EDWARD CHARLES, 7 *Great Ducie Street, Manchester*.—The *peri*, campanula, or fairy bells.

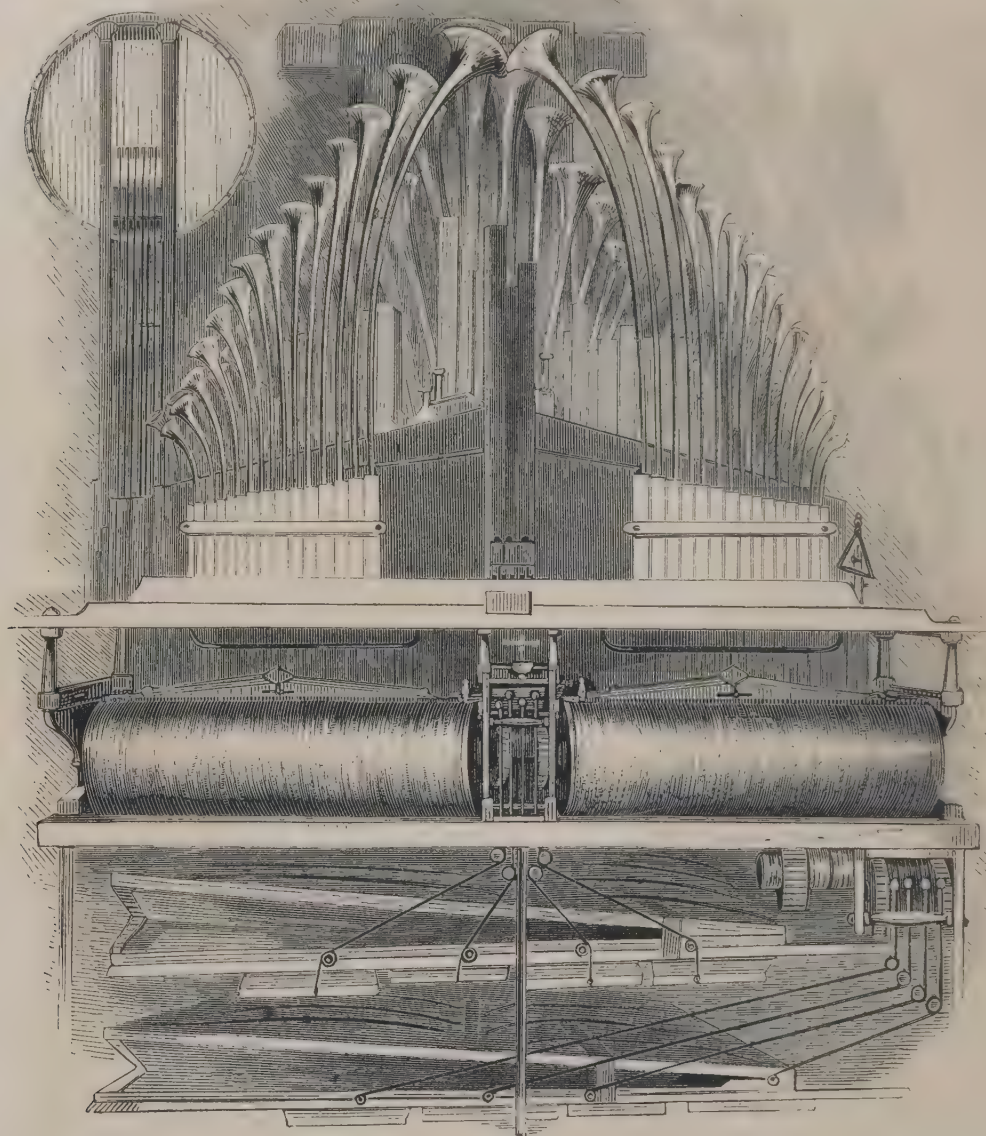
[3423]

LUFF, G., & SON, 103 *Great Russell Street, Bloomsbury, W.C.*—Model piccolo piano.

[3424]

MATTHEWS, WILLIAM, & SONS, 5 *St. James's Street, Nottingham*.—Pianoforte with propeller action.

IMHOF & MUKLE, 547 *Oxford Street*.—Orchestrion, or self-acting organ.



ORCHESTRION, OR SELF-ACTING ORGAN.

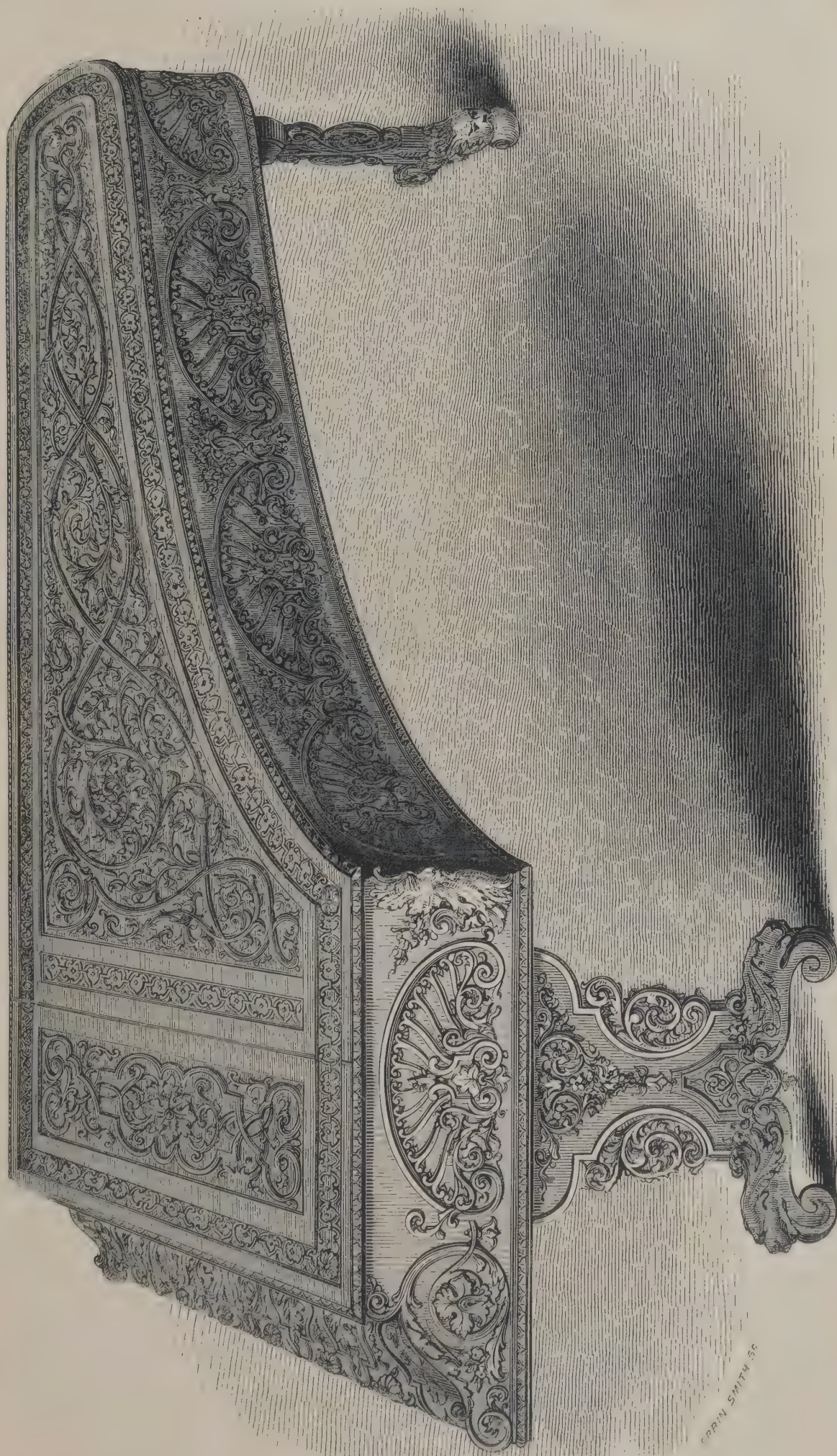
The Orchestrion, built for the International Exhibition of 1862, is a striking example of the capabilities of mechanism for producing perfect music. On this instrument hundreds of different effects, variations, and shades of tone can be produced. The mechanism is so perfect that its action is instantaneous, and free from noise and inconvenience to the person working it. The great simplicity of its construction renders the Orchestrion a most durable instrument. As the two barrels can be conveniently removed from the front, the Orchestrion does not require more space than its width.

The deepest notes are placed in the centre of the instrument, so that the tuner can tune each and every pipe easily from the sides without removing anything. By the application of an additional fly, the speed can be regulated to the greatest nicety, so as to give detailed effects to the music in performing. In this and many other respects the Orchestrion is different and superior to other self-acting musical instruments.

IMHOF & MUKLE are the manufacturers of the "Flutonichorde," which can be instantly attached to any pianoforte. Subjoined is a price list of musical instruments manufactured by this firm, and also instruments for which they are agents:—

- Orchestrions, 1000 Guineas and upwards.
- Euterpeons, 200 to 800 guineas.
- Flute instruments à la Davrainville, 30 to 400 guineas.
- Self-acting organs, 24 to 60 guineas.
- Musical clocks, 24 to 200 guineas.
- Portable organs and pianos, 5 to 30 guineas.
- German handle-organs and pianos, for schools and nurseries, 5 to 60 guineas.
- Pianofortes, 1st class quality, 25 to 100 guineas.
- Nicole Frères' musical boxes, 4 to 40 guineas.

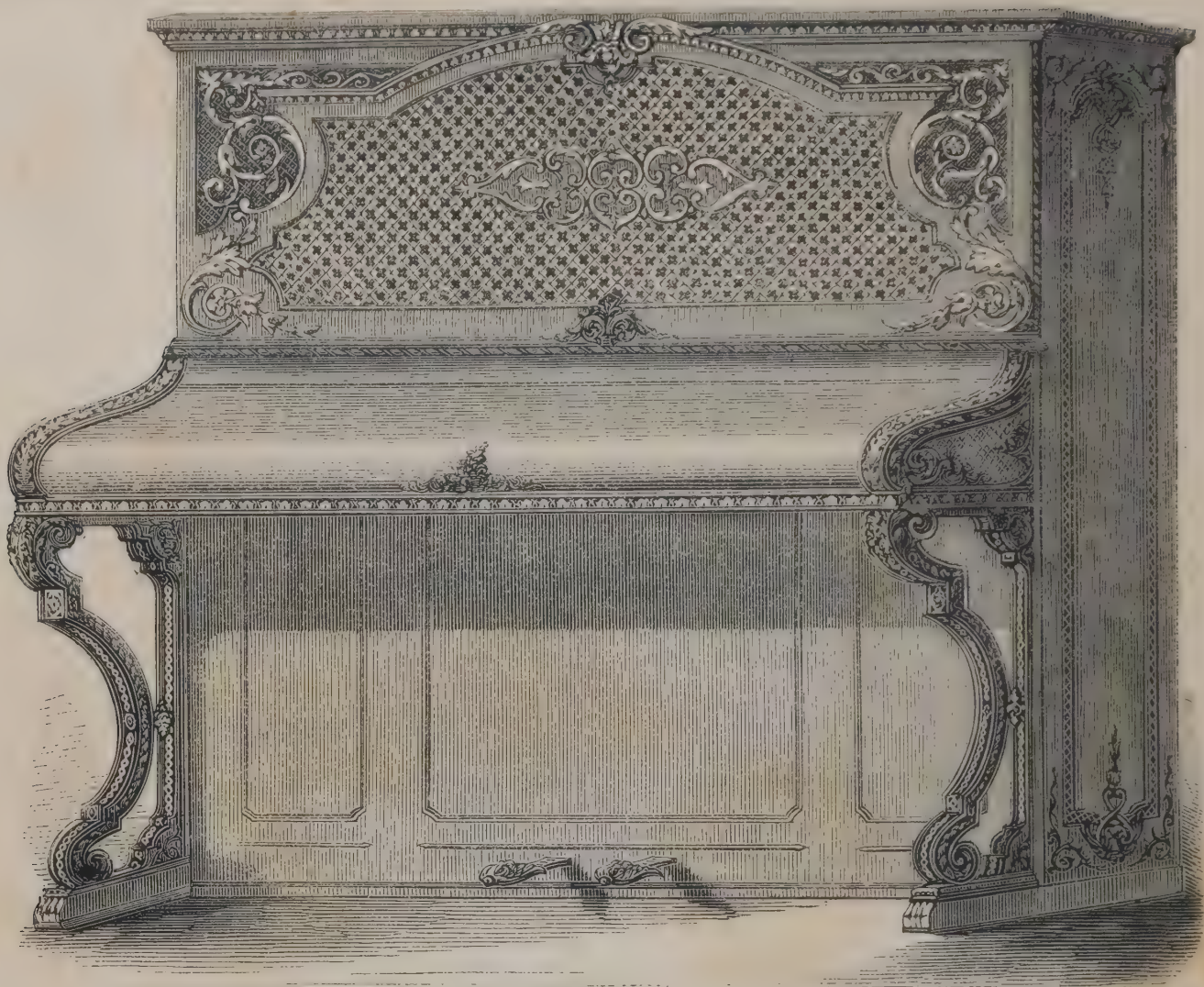
All these instruments are built to stand tropical climates.

KIRKMAN, JOSEPH, & SON, 3 *Soho Square*.—Pianofortes.

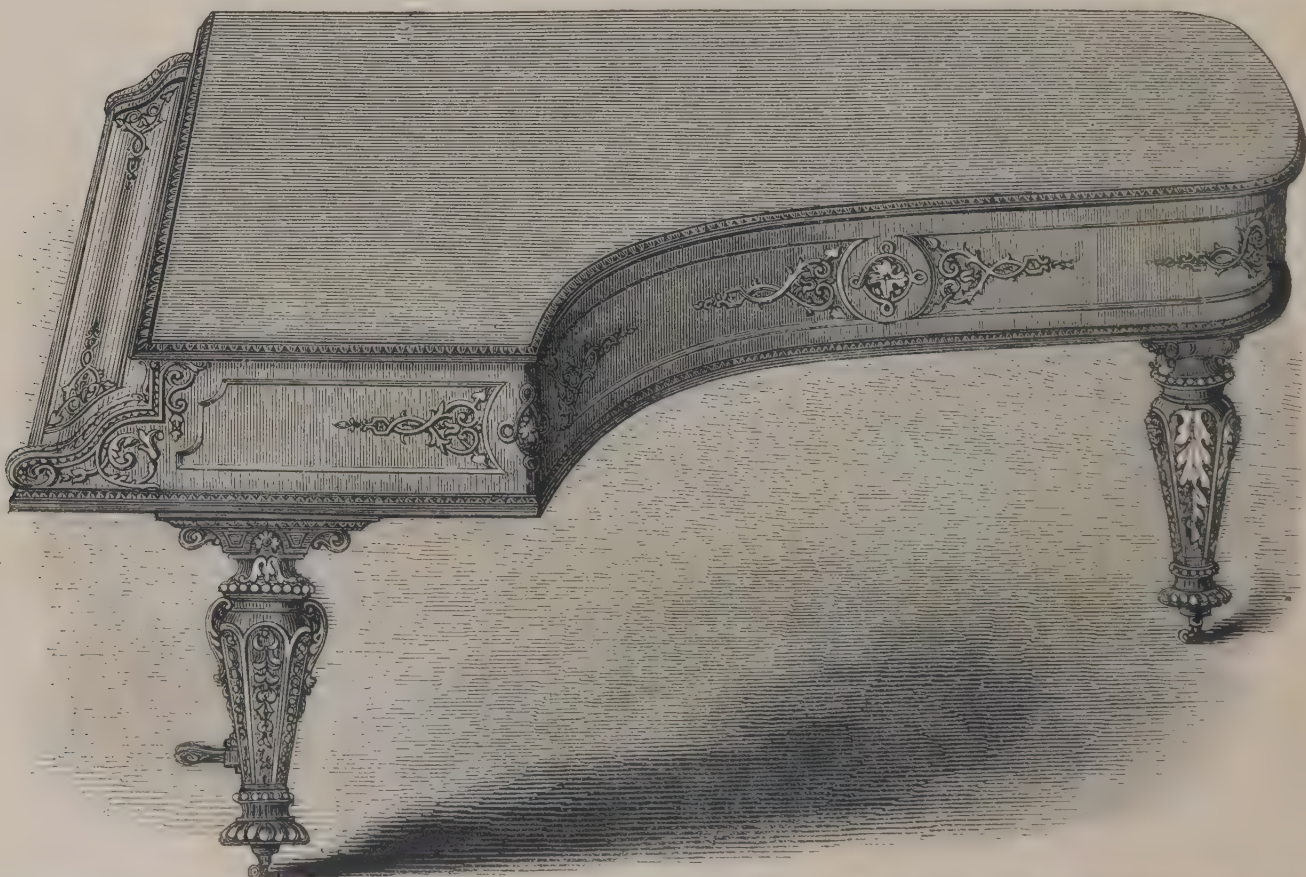
CONCERT GRAND PIANOFORTE, with seven octaves, A to A, under-dampers, repetition action, and all the latest improvements, in solid rosewood case, elaborately carved. The case of this instrument was carved at Madras, East Indies; the designs and working drawings were sent from England by J. KIRKMAN & SON; the case was made, and the carvings executed, by the native workmen in the most correct manner. As a specimen of native Indian skilled labour it is interesting, as showing the ready capability of the native carvers to apply the art in which they excel to any purpose that may be required. The top of this pianoforte is made out of a solid piece of rosewood, without a joint; it is 5 feet wide, and even in India it is rare to meet with rosewood of such large dimensions.

** This piano is exhibited in the Indian Department.

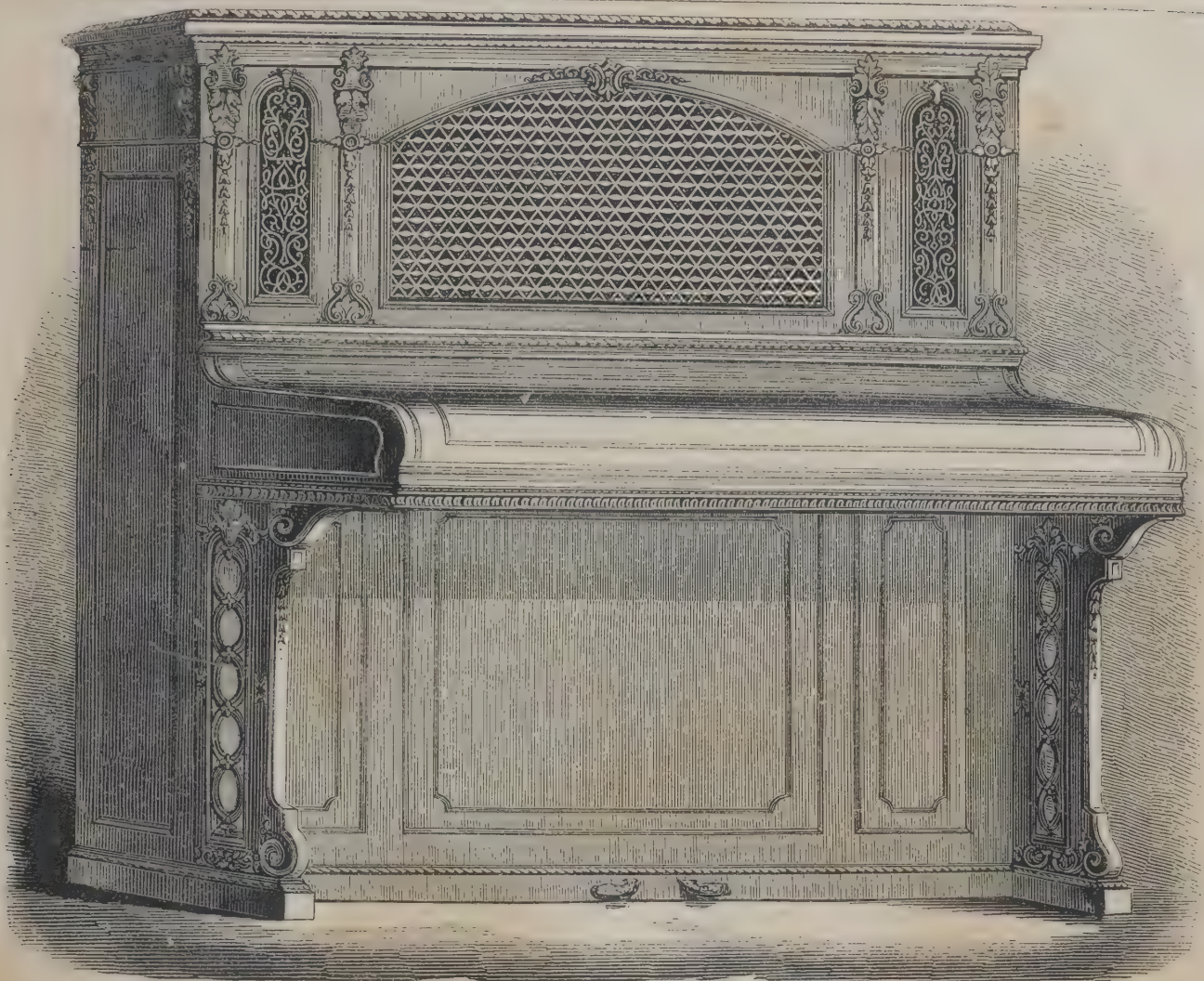
KIRKMAN, JOSEPH, & SON—*continued.*



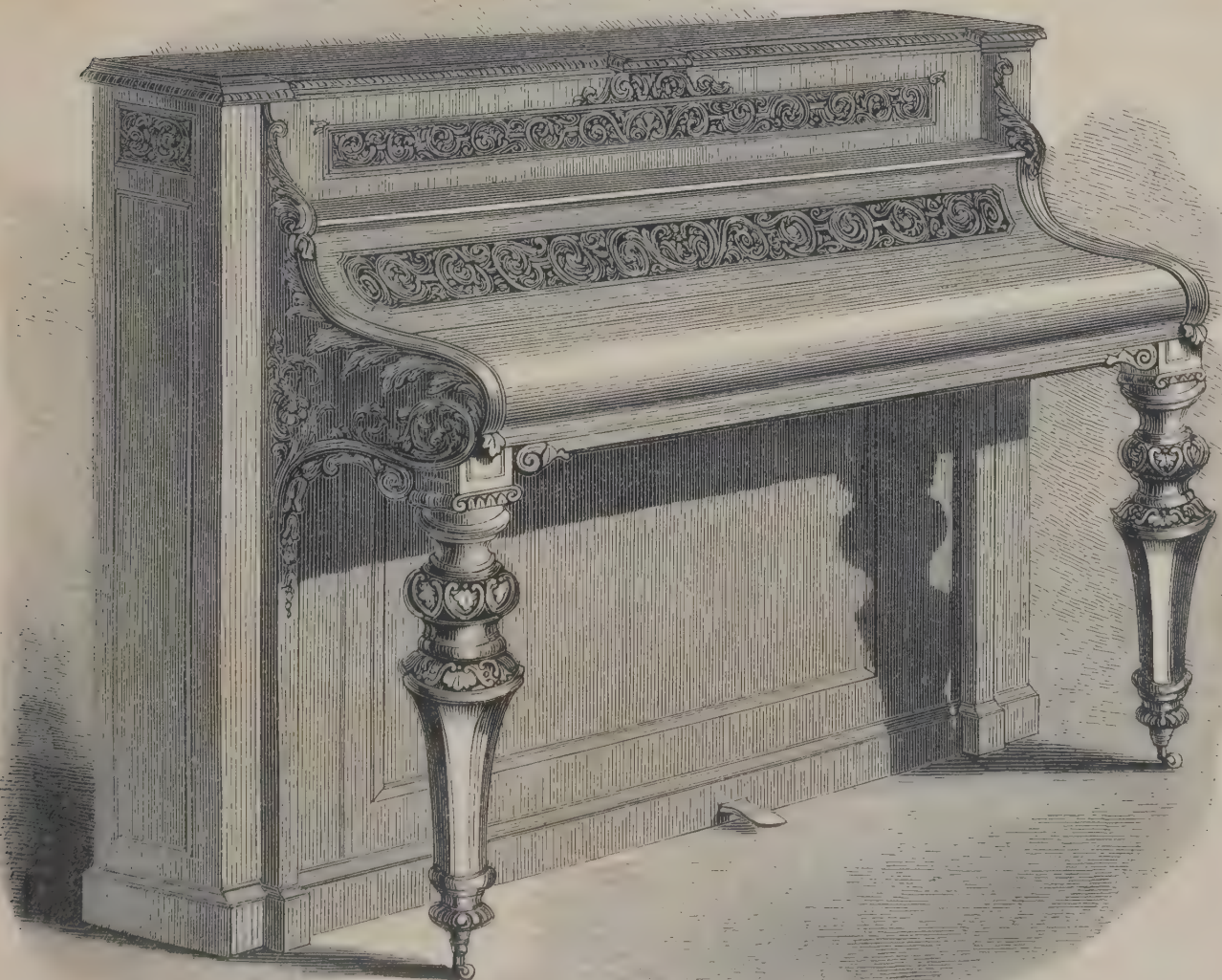
PATENT IMPROVED TRICHORD SEMI-COTTAGE PIANOFORTE, with seven octaves, A to A, and all the latest improvements, in ebony case richly carved and gilt.



CONCERT GRAND PIANOFORTE, with seven octaves, A to A, repeating action, and under-dampers, with new and improved up and down bearing bridges to preserve the sounding board in perfect equilibrium, and prevent its sinking; in English pollard oak case richly carved and gilt.

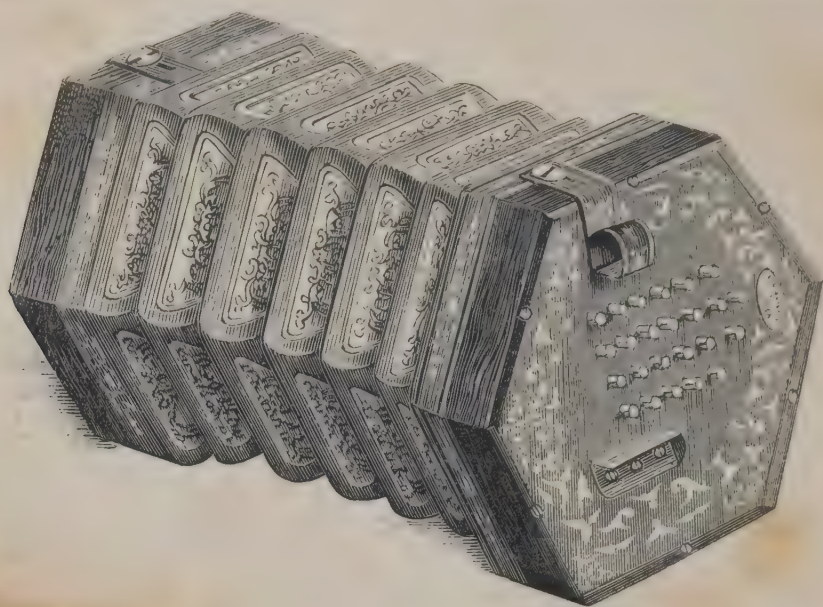


PATENT IMPROVED TRICHORD SEMI-COTTAGE PIANOFORTE, with seven octaves, A to A ; single action, English model, and all the latest improvements, in walnut, tulip-wood, and ebony case.

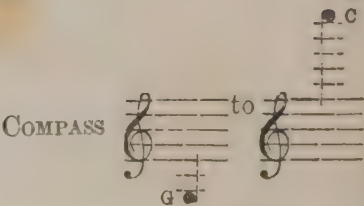


OBLIQUE GRAND PIANOFORTE, with seven octaves, A to A ; grand check action, and under-dampers, with improved sounding board, in Amboyna-wood case richly carved and gilt.

LACHENAL, LOUIS, 8 Little James Street, Bedford Row.—English patent concertinas.



ALL 48 KEYS, DOUBLE ACTION, IRON SCREWED BRASS NOTES, AND WARRANTED.
(Instruments of a Smaller Compass made to Order only, at the usual Prices.)



PRICE LIST, 1862, OF ENGLISH PATENT CONCERTINAS.

		£	s.	d.	Ordinary Metal Vibrators, but of the very best quality made.	Silver Vibrators, which give a beautiful, mellow, and subdued tone, suitable for Drawing-Rooms.	Tempered Steel Vibrators, which give a very sonorous, full-bodied tone, suitable for Concert-Room.	Gold Vibrators, which give the most distinct and justly proportioned quality of tone of any Metal.
1. THE PEOPLE'S CONCERTINA. Mahogany, in neatly covered Box		2	2	0				
2. Rosewood. Superior tone and finish	Mahogany Box	3	3	0				
3. Ditto, best finish, Five-fold Bellows, best finished	Mahogany Box	4	4	0				
4. Ditto, best finish, Five-fold Morocco Bellows, Moulded Edges	Rosewood Box	5	5	0				
5. Ditto, extra best finish, Five-fold Morocco Bellows, plain tops and no gilding, but with ornamented paper, German silver studs, and in every other respect as the Concert Concertina before its improvement	Rosewood Box	6	16	6				
6. Ditto, Newly Improved. Ornamented throughout, with Silver Touches for Concerts, contains louder and sweeter tone than any Treble Concertina ever before produced, and is adopted by all the most eminent Professors	Rosewood Box	..	8		Guineas.	Guineas.	Guineas.	Guineas.
7. Ebony, Newly Improved, etc., as above, with glass studs	Rosewood Box	..	10		10	12	14	15
8. Amboyna Coromandel Zebra (or any description of wood preferred), with Bellows and all pertaining to exterior finish tastefully matched, Silver Touches or Glass Studs, as preferred	Box to match	..	12		14	16	17	
9. Ivory Tops, all pertaining to exterior appearance tastefully matched, Silver Touches or Glass Studs, as preferred	Box of any wood	..	13		15	17	18	
Nos. 6 to 9 can also be had with Double Pans at Two Guineas each extra.								
TENOR OR BARITONE CONCERTINAS.								
10. Rosewood, Ivory Keys, three octaves and three notes, sounding an octave below the full compass Treble Instruments. Finished as No. 4	Rosewood Box	9	9	0	..	..	..	..
11. Ditto, Silver Touches. Finished as No. 6	Rosewood Box	..	11		11	13	15	..
Ebony	Rosewood Box	..	13		13	15	17	..
Amboyna, etc.	Rosewood Box	..	15		15	17	19	..
Ivory Tops	9 Box in any kind of Wood	..	18		18	20	22	..
No. 11 can be had with Double Pans at Two Guineas extra.								
SMALL OR LARGE BASS CONCERTINAS.								
12. Rosewood, Ivory Keys, three octaves, and three notes. Finished as No. 4	Rosewood Box	12	12	0	..	..	..	..
13. Ditto, Silver Touches. Finished as No. 6	Rosewood Box	..	15		15	..	..	..
Ebony	Rosewood Box	..	17		17	..	..	..
Amboyna, etc.	Box to match	..	19		19	..	..	..
Ivory Tops	9 Box in any kind of Wood	..	22		22	..	..	..
Tuning Apparatus (Mahogany), six-sided, with screw-driver, file, etc., complete, by means of which parties at a distance from a tuner can keep their own instrument in repair		0	12	6	..	..	..	..
Ditto, ditto, Superior quality, with four holes		0	18	6	..	..	..	..

[3425]

METZLER, G., & Co., *Great Marlborough Street, W.*—Brass military instruments, clarionets, &c.; specimens of printed music.

BRASS MUSICAL INSTRUMENTS, of improved circular form. Clarionets, &c., &c. Patented.

The SONOROPHONE. Invented by Mr. J. Waddell, Band-master of the First Life Guards. The excellence of these new instruments, and the marked improvement of their formation over the old system, has been admitted by the most competent judges. They are now in use in

the bands of the First Life Guards, Royal Engineers, several Regiments of the Line, the Navy and the Volunteer Corps. The following drawing is intended to show the relative size of two Contre-bass Instruments in *E* flat. Fig. 1.—the old form of the Saxe-horn; Fig. 2.—the Patent Sonorophone. The advantage and portability of the new form over the old may be seen at a glance

Fig. 1.



Fig. 2

Drawings, Testimonials, and Lists of Prices of METZLER & Co.'s various new Circular Brass Instruments may be had on application as above.

[3426]

MINASI, C., 3 *St. James's Terrace, Kentish Town Road.*—Music-stool; harmonium.

[3427]

MOORE, JOHN & HENRY, 104 *Bishopsgate Street Within, City.*—Microchordon grand pianoforte.

[3428]

MURPHY, GEORGE, *Albert Street, Camden Road, and 28 Cheapside.*—Pianofortes.

[3429]

DATES, JOSEPH PIMLOTT, *Erdington, Birmingham.*—Cornet with equi-tritubular, or champion, pistons and improved water-exit.

[3430]

DETZMAN & PLUMB, 151 *Regent Street, London.*—Three pianofortes.

[3431]

PEACHEY, GEORGE, Pianoforte Manufacturer, 73 *Bishopsgate Street Within, E.C.*—Improved tri-chord piccolo pianofortes.

PEACHEY'S IMPROVED TRICHORD PIANOFORTES are remarkable for their durability, power, and quality of tone.

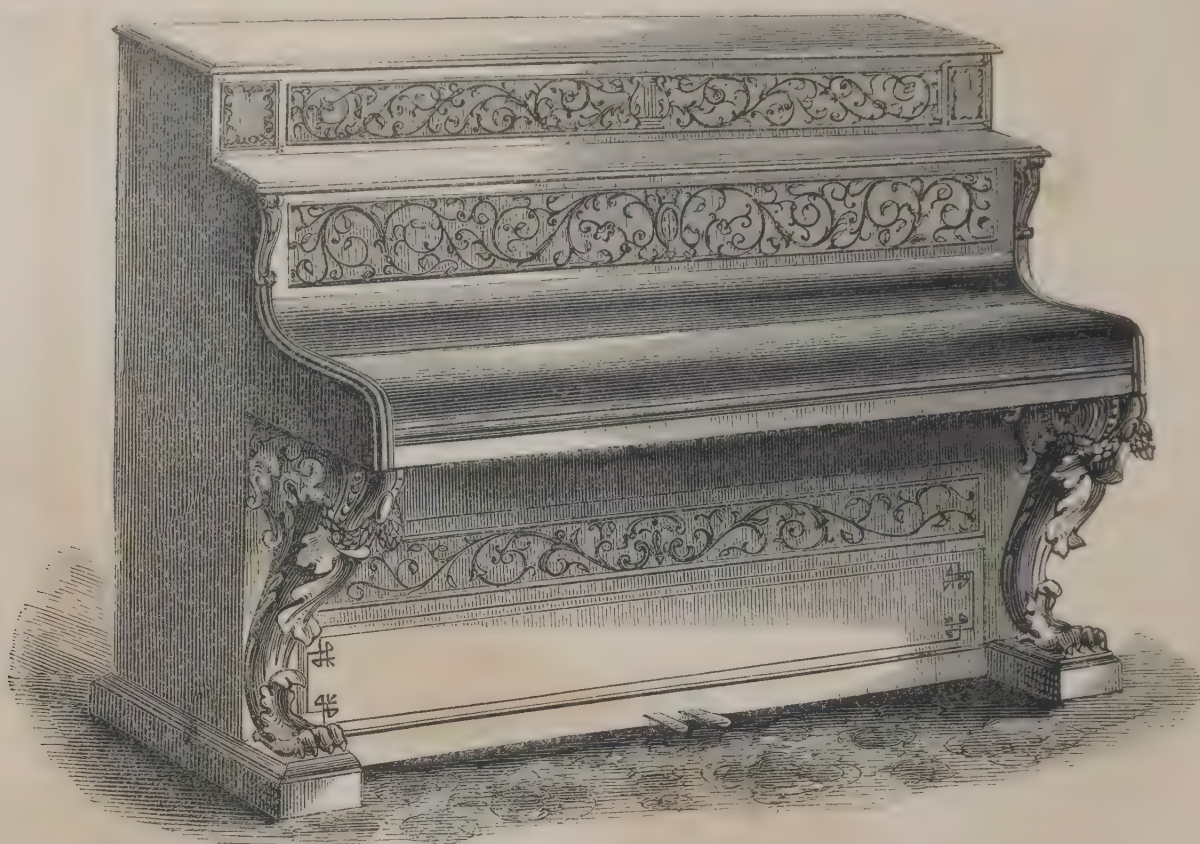
They may be bought or hired, with option of purchase from the maker.

[3432]

POTTER, HENRY, 36 *Charing Cross, W.C.*—Improved flute-valve, brass instruments, and drums.

[3433]

PRIESTLEY, FREDERICK, 15 *Berners Street, Oxford Street, W.*—Small pianofortes.



PATENT SIREN PIANOFORTE. Key-board full scale. Cash price 22 Guineas.

The action of these pianofortes possess all the advantages of the "Repetition Action," while, from the simplicity of their construction, they are superior to it in durability, and can be produced at one half the price.

[3434]

ROBSON, T. J., 101 *St. Martin's Lane*.—Organ.

[3435]

RUDALL, ROSE, CARTE, & Co., 20 *Charing Cross*.—Patent clarionets, flutes, military brass instruments, drums, &c.

[3436]

RUSSELL, GEORGE, 35 *Brook Street, Euston Road, N.W.*—Rosewood grand pianoforte.

[3437]

RÜST, ROBERT ANDERSON (RÜST & Co.), 34 *Great Marlborough Street, W.*—Pianoforte with patent tubular sounding-board, and newly-constructed case.

[3438]

SCOWEN, THOMAS LAYZELL, *Allen Road, Stoke Newington, London*.—Compass for dividing circles; ocular music timekeeper.

Newly invented compass for drawing circles without centre marks, and dividing the same into any number of parts without moving the instrument.

Patent ocular demonstrator of time in music, and accented. This instrument shows the exact duration of the

various notes and rests in each bar, and is provided with a hammer so constructed as to give a louder beat at the accented parts of the different bars, and varies to any degree of quickness or slowness, if required.

[3439]

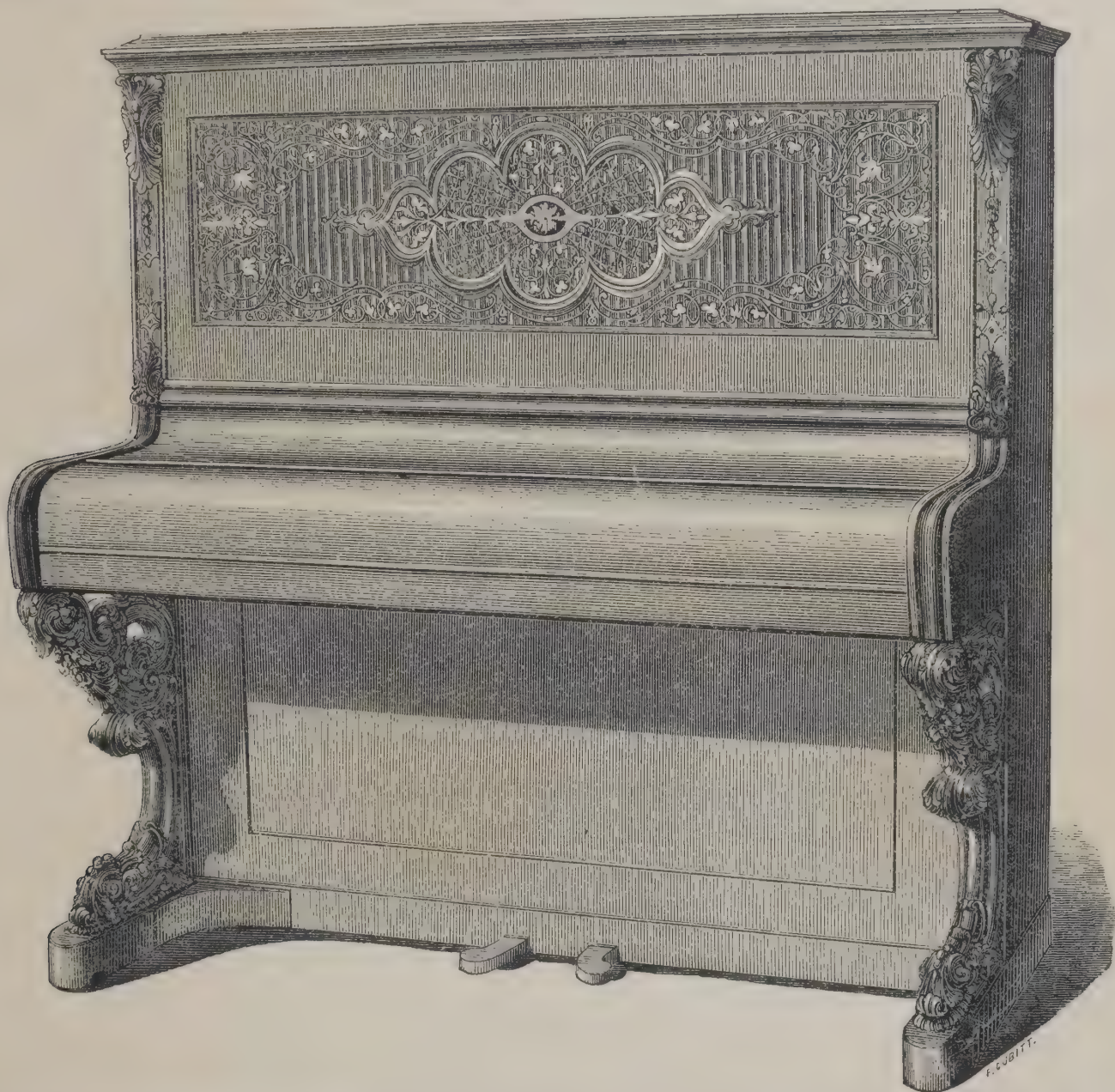
SHAW, J., & SON, *High Street, Glossop*.—Enharmonic piano.

[3440]

SIMPSON, JOHN, 266 *Regent Street*.—German concertinas, with Simpson's easy method; English concertinas, flutes, and flageolets.

[3441]

SPARKS, W. J., 13 *Eversholt Street, Oakley Square.*—Pianos.



W. J. SPARKS, inventor and manufacturer of the Trichord Cottage Piano, equal in power and quality of tone to the Horizontal Grand, price from 50 guineas. Superior cottage pianos from 25 guineas. Pianos for hire. W. J. Sparks, 13 *Eversholt Street, Oakley Square, London, N.W.*

[3442]

STARCK, JOHN EDWARD, 25 *Old Street, St. Luke's, E.C.*—Flutes, flageolots, clarionets, drums, fifes, &c.

[3443]

THOMPSON, H., 322 *Regent Street.*—Orchestral piano, extra pedal, producing chords and octaves.

[3444]

TURNBULL, WILLIAM, 83 *Mary Street, Hampstead Road.*—A set of pianoforte keys.

[3445]

WALKER, J. W., 27 *Francis Street, Bedford Square, W.C.*—Church and chamber organs.

[3446]

WARD, HENRY, 100 *Great Russell Street, Bloomsbury.*—Piano.

[3447]

WILLIAMS, WILLIAM, 36 *New King Street, Bath.*—Patent grand pianoforte.

[3448]

WILLIS, HENRY, *Albany Street, Regent's Park.*—An organ with four manuals and pedal organ, and 60 stops.

[3449]

WILSON, WILLIAM, *Fairbank Villa, Talfourd Road, Camberwell.*—An omnitonic flute, adjustable at will to any key.

The most important features of this flute are its perfection of intonation and capability of adjustment, combined with simplicity of manipulation. The several parts of the flute adjustable at pleasure to vary the distances between the finger-holes; by which means the relative intervals are determined with mathematical precision,

and (being variable) are preserved perfectly true alike in all keys; while the fingering is reduced to the utmost simplicity. The instrument being tuned to the key of the piece to be performed, it is only necessary generally to learn one simple scale, as the scale *D* on an ordinary concert flute.

[3450]

WORNUM, R., & SONS, *Store Street, Bedford Square, London.*—Upright and horizontal pianofortes.

[3451]

BATES & SON, 6 *Ludgate Hill.*—A small organ.

[3452]

COHLMANN & SON, *Halifax.*—Grand action, oblique, and upright pianos.

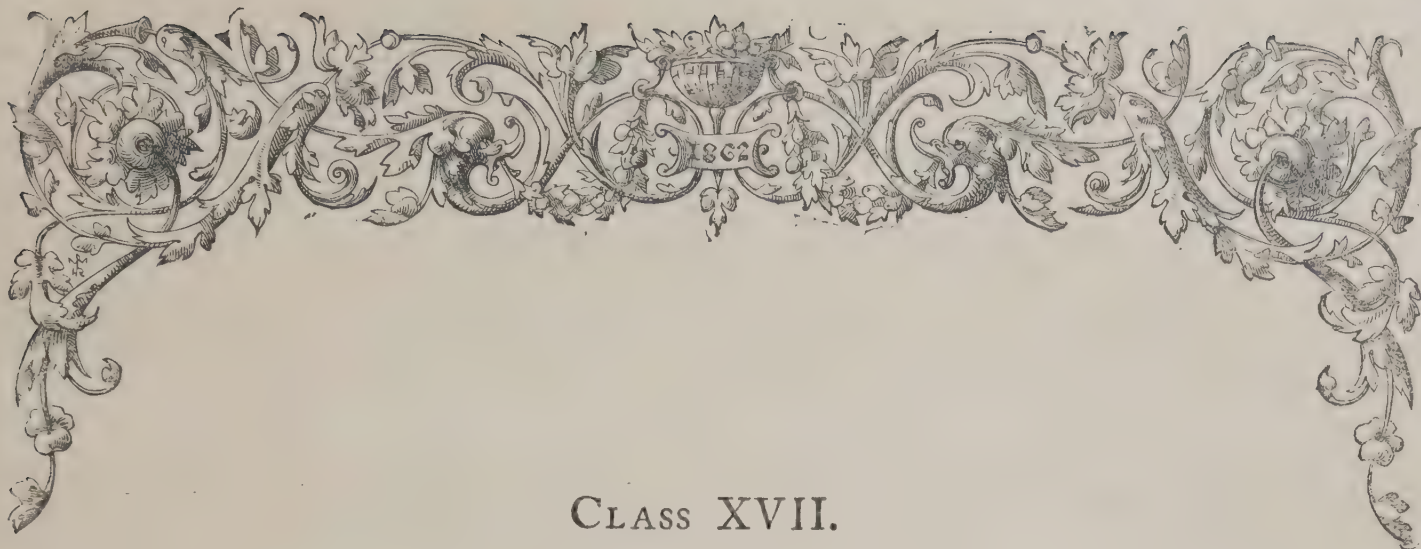
[3453]

NUTTING & ADDISON, 210 *Regent Street.*—A piano.

[3454]

STIDOLPH, G. F. & J.—*Woodbridge, Suffolk.*—A small minima organ.





CLASS XVII.

SURGICAL INSTRUMENTS AND APPLIANCES.

[3482]

ARBUCKLE, JOSEPH, *South Bridge, Edinburgh*.—A hernia truss; illustrations; improvements on working tools for making trusses.

[3483]

ASH, CLAUDIUS, & SONS, 7, 8, & 9 *Broad Street, Golden Square, London*.—Artificial teeth, and dental materials.

[3484]

ATKINSON, BENJAMIN FREDERICK, 3 *Hemming's Row, Charing Cross*.—Trusses for piles, prolapsus ani and uteri, and inguinal and scrotal hernia; splint for diseased hip-joint.

[3485]

BAILEY, WILLIAM HUNTLY, 418 *Oxford Street, London*.—Trusses, elastic stockings, deformity and surgical instruments, enemas, and belts.

[3486]

BARLING, JOSEPH, 7 *High Street, Maidstone, Kent*.—Specimens of crystal gold in sponge and leaf, for dentists.

[3487]

BASSINGHAM, BENJAMIN, Manufacturer, 5 *Ruby Street, Wisbeach*.—Artificial leg upon self-acting principles, &c.

[3488]

BIGG, HENRY HEATHER, 29 *Leicester Square*.—Orthopædic and anatomical appliances for bodily deformities, weaknesses, and deficiencies. (*See page 118.*)

[3489]

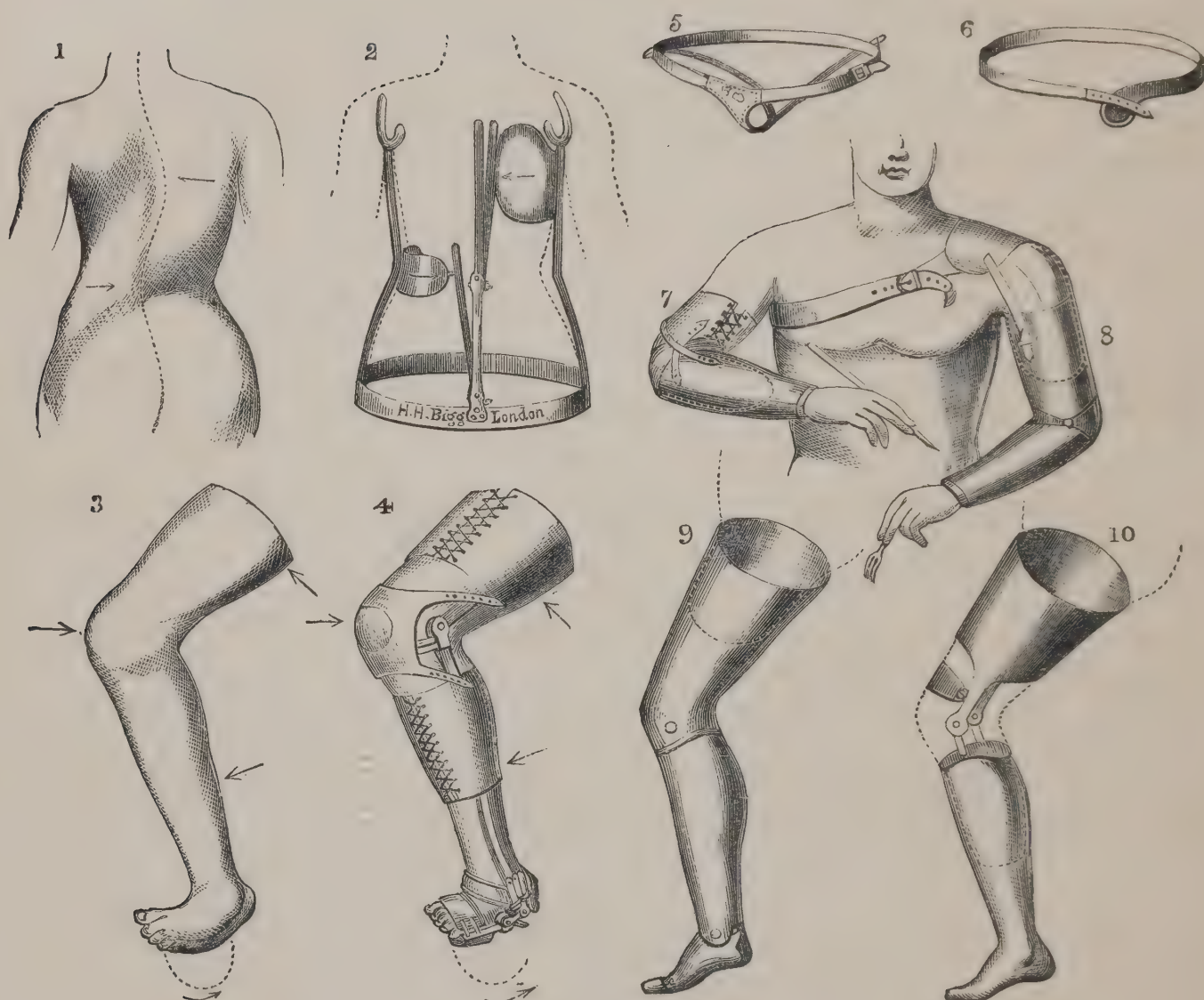
BLACKWELL, W. & CO., *Cranbourne Street, and Bedford Court*.—Surgical instruments, crutches, trusses, &c.; tailors' shears, razors, crayons, cutlery, &c.

[3490]

BLENDELL, WALTER, Dentist, 3 *Holles Street, Cavendish Square, London*.—Improved artificial teeth.

BIGG, HENRY HEATHER, Assoc. Inst. C.E., 29 *Leicester Square*.—Orthopractic and anatomical appliances for bodily deformities, weaknesses, and deficiencies.

[Obtained Prize Medal at the Exhibition of 1851.]



This collection of inventions and appliances is intended to illustrate the rapid progress of the new science of Mechanical Orthopraxy, of which the exhibitor is one of the most active promoters. The case contains 42 new inventions, amongst which are—

1, 2. Apparatus for treatment and cure of spinal curvature.

3, 4. Appliance for cure of contracted knee, club foot, and deformities of the foot and ankle (tibio-tarsal region).

5. Triple lever truss, for the treatment of hernia or rupture.

6. Sand pad Truss, for inguinal, scrotal, and femoral hernia.

7. Artificial arm, with wrist and finger articulations, spring-thumb, &c., for use after amputation below elbow.

8. Artificial arm, with moveable elbow, wrist and finger joints, for use after amputation above elbow.

9. Artificial leg, for amputation above knee, with elastic tendons and muscles acting as they do in nature.

10. Artificial leg, for amputation below knee, with knee, ankle, and toe articulations moved by elastic springs.

[3491]

BROWN, SAMUEL SHAW, *Ellesmere Works, Runcorn*.—Flax and cotton lint, elastic stockings, abdominal belts, knee-caps, &c.

[3492]

BROWNING, EDWARD, 38 *Montague Square, W.*—Artificial teeth, &c.

[3493]

CALKIN, JOSEPH, 12 *Oakley Square, N.W.*—The “occhiombra,” or patent transparent ventilating eye protector.

[3494]

CAPLIN, DR., 9 *York Place, Baker Street*.—Electro-chemical bath, for the cure of chronic diseases of all kinds.

[3495]

CAPPIE, JAMES, M.D., *Edinburgh*.—Obstetric forceps, in which the handle and blade are united by socket-joint.

[3496]

CARTE, ALEXANDER, M.D., T.C.D., F.R.C.P.I., *Royal Hospital*.—Instrument for the treatment of aneurism by compression.

[3497]

CLELAND & HILL, 146 *George Street, Glasgow*.—Artificial limbs on a new principle, strong, light, and substantial.

[3498]

CLOVER, J., 3 *Cavendish Place*.—Inhaler, chloroform, &c. Gives chloroform vapour any strength required, under $4\frac{1}{2}$ per cent.

[3499]

COGHLAN, JOHN, M.D., *Wexford*.—A probe-pointed knife for dividing the neck of the womb; a drill-carrier for dentists, to be used within the mouth.

[3500]

COLES, WILLIAM, & Co., Patentees, 3 *Charing Cross*.—Patent spiral-spring trusses.

This is a novel and greatly improved truss, and is commended by the patronage of Sir Ashley Cooper, many of our most eminent surgeons, and by the adoption and recommendation of William Cobbett. It is perfectly effi-

cient, and at the same time agreeable to the wearer. For thirty years it has had a steadily increasing reputation. Each truss bears the name and address of the patentee.

[3501]

COLLINS, DANIEL JOSEPH, 48 *Foley Street, London, W.*—Surgical appliance; also various instruments, dental and surgical.

[3502]

COXETER, JAMES, 23 & 24 *Grafton Street East, Tottenham Court Road*.—Surgeon's instruments, including new form of lithotrite and double current catheter.

[*Obtained Prize Medal in 1851.*]

The following are exhibited, viz. :—

COXETER'S LITHOTRITE, with new movement which greatly facilitates the alternate use of *sliding action* and *screw action*, a desideratum of great importance in seizing and crushing the stone.

Coxeter's double-current catheter, with opening for inlet stream, so formed as to keep the “debris” in motion, to promote its more speedy exit.

Urethrotome and catheter combined, by H. Thompson, Esq.

Stethometer of new form, by T. Griffiths, Esq.

Coxeter's Magneto-electro machine, worked by the foot instead of the hand.

Coxeter's Spring pessary, for Prolapsus Uteri.

Coxeter's Spirometer, of new and simple form.

Coxeter's Compound Uterine Syringe.

[3503]

CRAPPER & BRIERLEY, Manufacturing Dentists, *Hanley, Staffordshire*.—Registered porcelain trays, mineral teeth, &c.

These registered impression trays are invented and manufactured by the exhibitors. They are made in every variety of shape in china, porcelain, and earthenware. Specimens of various kinds are exhibited, together with mineral teeth of extra strength for vulcanite work, tubular or flat, and a variety of materials used in dentistry. The porcelain tooth-powder may be obtained in boxes, price 1s. each.

[3504]

DIXON, THOMAS, 4 & 7 *St. James's Place*.—Nightingale cradle; Nightingale bed; stove for hothouses and drying-rooms.

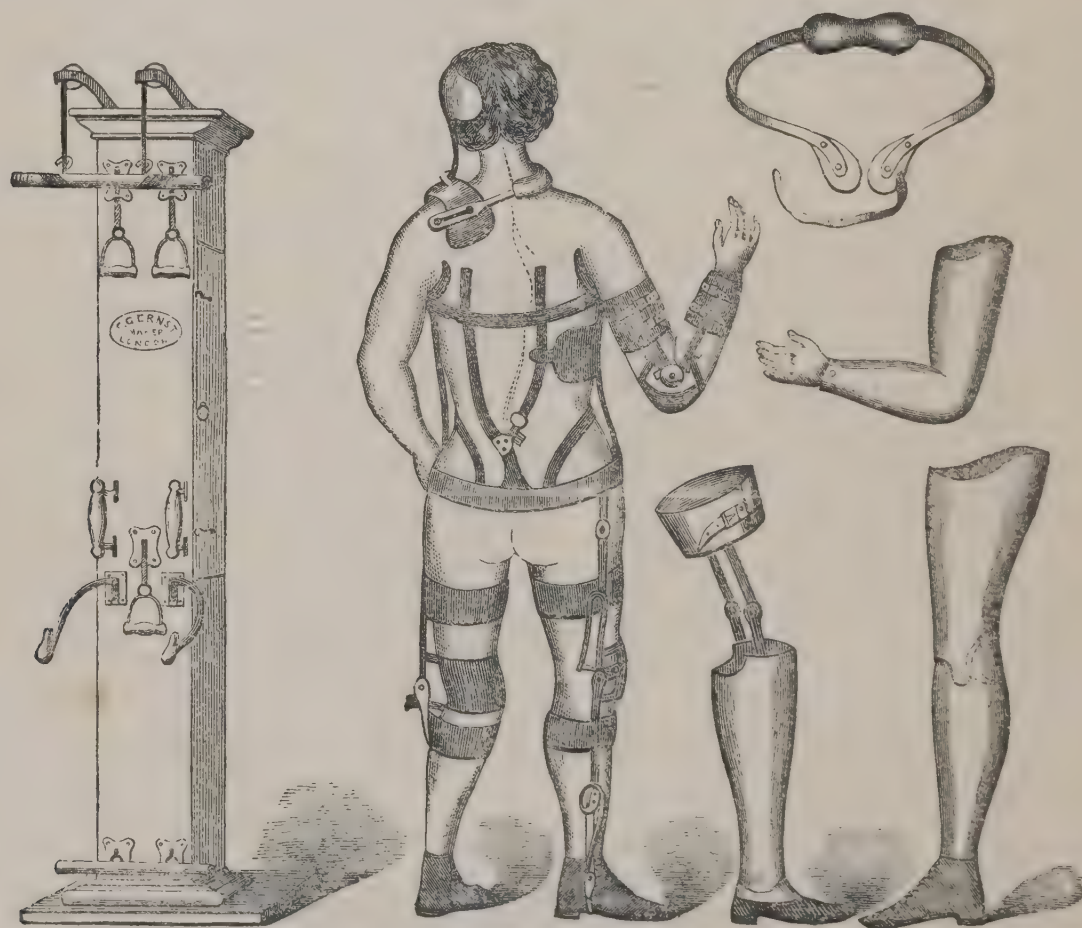
[3505]

DURROCH, WILLIAM FRAZER, 28 *St. Thomas Street East*, and 1 *Dean Street, Borough*.—Surgical instruments, &c.

The exhibitor is Surgical Instrument Maker to the Royal Navy, Greenwich Hospital, Guy's Hospital, &c. He manufactures all descriptions of surgical instruments, and has attained a high reputation by several important improvements. He manufactures instruments to drawings; and both in making and repairs employs the best materials and skilled labour.

[3506]

ERNST, FRIEDRICH GUSTAV, 19 *Calthorpe Street, W.C.*—Orthopædic and anatomical appliances; and surgical instruments.



MR. ERNST is the author of the "PORTABLE GYMNASIUM," a manual of exercises for self-instruction in Home Gymnastics. He is also favourably known as a maker of surgical instruments, elastic bandages, and the various appliances necessary in cases of lost, deformed, or weak limbs, vertebral derelictions, and other local muscular relaxations.

[3507]

EVANS & STEVENS, 12 *Old Fish Street, St. Paul's, London*.—A complete collection of surgical instruments.

[3508]

EVANS, CALEB, *The Hospital, Birkenhead*.—Arm splint.

[3509]

EVARD, JOHN, 35 *Charles Street, Middlesex Hospital*.—Instrument for lithotrity; bone-cutting forceps, with parallel action; dental instrument.

[3510]

FAULKNER, HENRY, 24 *Keppel Street, Russell Square*.—Improved method of constructing artificial teeth in vulcanite.

[3511]

FAULKNER, JOHN, Practical Dentist, 2 *Mornington Crescent, Hampstead Road, N.W.*.—Specimens of pink vulcanite base for artificial teeth.

[3512]

FERGUSON, J. & J., 21 *Giltspur Street, London, E.C.*.—Surgical instruments.

[3513]

FITKIN, WILLIAM, 88 *Fleet Street*.—Patent safety elevator for the instantaneous and painless extraction of teeth and stumps.

The object of FITKIN'S PATENT SAFETY ELEVATOR is the extraction of teeth and stumps with greater safety and | much less pain than attends the use of the ordinary instruments.

[3514]

FRANÇOIS, HENRY, 42 *Judd Street, Euston Road*.—Artificial teeth, with bases of india-rubber, coralite, gold, &c.

Various specimens of gold, vulcanized india-rubber, and coralite bases for ARTIFICIAL TEETH.

A complete set and a partial set in gold.

Complete sets and pieces of from one to ten teeth, in various kinds of vulcanized india-rubber, namely, pink, red, coralite, and black; the teeth used are the best mineral, and some have artificial mineral gums. Vulcanized india-rubber as a base for artificial teeth has nearly superseded metal, bone, &c. The advantages arising from its adoption are very numerous. All sharp edges are avoided; no springs, wires, or ligatures are required; no extraction of stumps, nor other painful operations, are necessary; a greatly increased freedom of

suction is supplied; a natural elasticity, hitherto wholly unattainable, and a fit perfected with the most unerring accuracy, are secured; while, from the softness and flexibility of the agents employed, the greatest support is given to the adjoining teeth when loose or rendered tender by the absorption of the gums; the acids of the mouth exert no agency on the prepared india-rubber, all unpleasantness of taste and smell being at the same time provided against.

A complete set in gold varies from 10*l.* 10*s.* to 21*l.*; partial sets, from 10*s.* 6*d.* to 15*s.* per tooth. Sets in vulcanized india-rubber, from 5*l.* to 15*l.*; partial sets, from 5*s.* to 10*s.* 6*d.* per tooth.

[3515]

FRESCO, ANDRÉ, 7 *Grosvenor Street, Grosvenor Square*.—Artificial teeth; and tooth-powder called Fresco's odonto.

[3516]

GABRIEL, M. & A., 27 *Harley Street, and 34 Ludgate Hill*.—Artificial teeth, with improved air-cells and soft gums. (*See page 122.*)

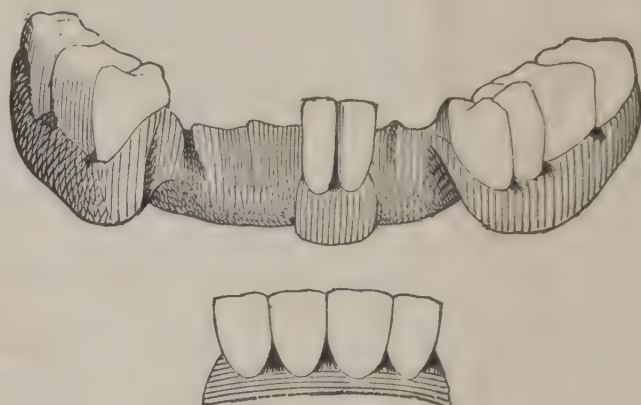
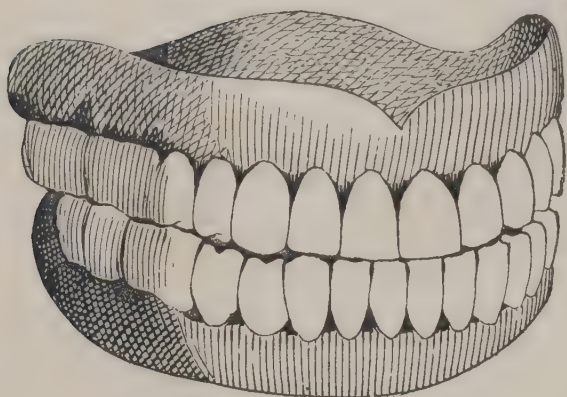
[3517]

GANNON, THOMAS, Manufacturing Gas-fitter, &c., *Liquorpond Street, London*.—Improved patent self-adjusting leg and foot-rest.

[3518]

GARDEN, DR., *Edinburgh*.—New forceps and elevator, adapted for the extraction of all kinds of teeth and stumps.

GABRIEL, M. & A., 27 *Harley Street*, and 34 *Ludgate Hill*.—Artificial teeth, with improved air-cells and soft gums.



The exhibitors are the patentees and sole proprietors of the OSTEO EIDON, or artificial bone, as a base for GABRIELS' INDESTRUCTIBLE MINERAL TEETH and SELF-ADHESIVE GUMS. One set will last a lifetime, and is warranted to answer every purpose for mastication and articulation, even when all others fail. They are adjusted without springs, wires, or any unpleasant operation.

Specimens of Messrs. Gabriels' patented improvements may be seen on their stand; where also a descriptive catalogue, in French and English, with the cost of

the various descriptions of artificial teeth, may be obtained gratis. Complete sets of these teeth can be made with *one visit*, where time is an object.

GABRIELS' PATENT WHITE ENAMEL, for restoring and preserving front teeth, retains its colour without injury to the enamel.

Their addresses are :—27 *Harley Street*, *Cavendish Square*, and 34 *Ludgate Hill*, *London*; 134 *Duke Street*, *Liverpool*; 65 *New Street*, *Birmingham*.

[3519]

GARRETT, JAMES ALEXANDER, 38 *Wardour Street*, *W.*—Trusses and surgical bandages.

[3520]

GILL, THOMAS DYKE, 84 *John Street*, *Tottenham Court Road*.—Improved gas vulcanizer for dentists.

[3521]

GRAY & HALFORD, 171 *Goswell Road*, *E.C.*—Artificial human eyes.

[3522]

GRAY, JOSEPH, & Co., 154 *Fitzwilliam Street*, *Sheffield*.—Surgical, dental, veterinary trusses; enema apparatus, lancets, &c.

[3523]

GRIFFITHS, RAYMOND, 2 *Duke Street*, *West Smithfield*.—Medicine chests and sample cases.

[3524]

GROSSMITH, WILLIAM ROBERT, 175 *Fleet Street*, *London*.—Patent and prize-medal artificial eyes, legs, arms, hands, &c. (*See page 123.*)

[3525]

HALLAM, F. H., 9 *Endell Street*, *Long Acre*, *W.C.*—Dental instruments.

GROSSMITH, WILLIAM ROBERT, 175 *Fleet Street, London*.—Patent and prize-medal artificial eyes, legs, arms, hands, &c.

[*Obtained Prize Medals at the Exhibitions of 1851 and 1855.*]



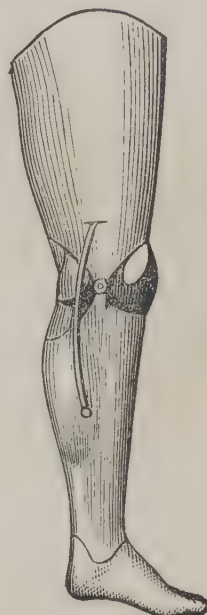
ARTIFICIAL LEGS, ARMS, HANDS, NOSES, &c., with the following newly invented improvements :—

1. A limb for contracted knee-joints (amputation below knee), giving a perfect artificial action at the knee.

2. A foot apparatus, for Symes and Chopart's operations, securing a neater appearance and firmer bearing than has been yet obtained for these cases.

3. A new limb for "Thigh amputations," containing all the advantages of the tendon action, Palmer's patent, and Grossmith's patent knee and ankle actions, with thorough durability and lightness in weight. Also a new method of making the joints of artificial limbs waterproof and noiseless in action.

4. Artificial eyes, of a new and hardened enamel, to prevent corrosion and secure a more lasting brilliancy and life-like appearance.



[3526]

HARNETT, WILLIAM, 12 *Panton Square, Coventry Street*.—Mineral teeth for vulcanite and gold, and all articles appertaining to dentistry.

[3528]

HAYES, GEORGE, M.D., 66 *Conduit Street, Regent Street, W.*—Mechanical dentistry fully illustrated.

[3530]

HILLIARD, WILLIAM B., 65 *Renfield Street, Glasgow*.—Surgical instruments (original inventions), artificial leg; hernia trusses; table-knife cleaner on new principle.

[3531]

HOOPER, WILLIAM, *Pall Mall East, S.W.*—Hydrostatic beds and cushions, and patent bed-lift for invalids.

[3532]

HOY, J., 6 *Pickering Place, W.*—Truss for hernia.

[3533]

HUDSON, THOMAS, Chemist, *South Shields*.—Deodorizing ashpit—preserving fertilizing elements for vegetation; improved tooth-stump instrument.

[3534]

HUXLEY, EDWARD, 12 *Old Cavendish Street, Oxford Street*.—Surgical bandages and mechanical trusses.

[3535]

JOHNSON, THOMAS, *Commercial Road East*.—Model of a portable apparatus for slinging horses whilst under surgical treatment.

[3536]

LAMBERT, PETER, 18 *Charlotte Street, Bedford Square, W.C.*—Artificial teeth.

[3537]

LAURENCE & Co., *Islington, London*.—Patent horse-hair, dry friction, and bath gloves, for promoting health.

[3538]

LAWSON, BUXTON, & Co., *Shales Moor Works, Sheffield.*—Surgical, dental, and veterinary instruments.

[3539]

LEARWOOD, THOMAS, *Fairmantle Street, Truro, Cornwall.*—Artificial limbs for all kinds of amputations; trusses without spring.

[3540]

LEMALE, T., & Co., 62 *Chandos Street, W.*—Artificial teeth and gums.

[3541]

LINDSEY, MARK JOHN, 37 *Ludgate Street, City.*—Lindsey's patent truss, without steel spring, and various other trusses, &c., with improvements.

LINDSEY'S NEW PATENT TRUSS, the most recent invention for hernia, consists of a covered plate with patent padding to support *both* hernia rings, and an elastic

waist-belt: the pressure can be regulated by the patient, and the truss is perfectly easy and effective.

Prices 15s. 6d., 21s. 6d., 26s. 6d., 31s. 6d.

[3542]

LONGDON, F., & Co., *Derby.*—Surgical elastic stockings, knee-caps, belts, and other bandages.

[3543]

LOWS, ANDREW, 19 *Lowther Street, Carlisle.*—Specimens of dental workmanship.

[3544]

MACINTOSH, CHARLES, & Co., *Cannon Street, London; and Cambridge Street, Manchester.*—Vulcanized rubber surgical and chemical apparatus.

[3545]

MACINTOSH, JOHN, 40 *North Bank, Regent's Park.*—Collodion, used as a setting for artificial teeth.

[3546]

MARSDEN, W. J., *Upper Thorpe Road, Sheffield.*—Patent respirators; registered shield chest protectors; ventilated eye-shade; animal oil wool knee-cap.

[3547]

MASTERS, MOSES, Manufacturer, 1 *Paragon Street, New Kent Road, London.*—Artificial hands, arms, legs, and crutches.

[3548]

MATTHEWS, WILLIAM, 8 *Portugal Street, Lincoln's Inn Fields, W.C.*—Surgical instruments and appliances.

[3549]

MAURICE, JOSEPH, 3 *Langham Place, W.*—Artificial teeth, showing the various applications of vulcanized india-rubber.

[3550]

MAW, S., & SON, 11 *Aldersgate Street, London.*—Surgical instruments. (See page 125.)

[3551]

MILLER, CLAUDIUS MONTAGUE, M.D., *Claremont Villa, Stoke Newington Road.*—Spectacles for the relief of conical cornea.

[3552]

MILLIKIN, JOHN (late BIGG & MILLIKIN), 9 *St. Thomas's Street, Borough.*—Surgeons' instruments and appliances.

MAW, S., & SON, 11 *Aldersgate Street, London.*—Surgical Instruments.

Amputating Cases, including those ordered for Army and Navy surgeons, in accordance with the latest Government regulations. Portable set of field instruments.

Abdominal Supporters.—Laced and elastic stockings, knee-caps, bandages, and suspenders.

Breast Pumps, brass and electro-plated, in mahogany and morocco cases; and a number of very useful and modern apparatus for relieving the breast.

Bougies and Catheters, in silver, German silver, electro-plated, and elastic gum.

Brass Anatomical and Ear Syringes, with ivory pipes; also a variety of patterns of syringes in glass and Britannia metal, for the eye, ear, urethra, vagina, &c.

Caustic Cases and holders, in silver, silver-gilt, platinum, ebony, &c., &c.

Cupping Apparatus, complete sets, in morocco and mahogany cases.

Dissecting and Post-Mortem Instruments, full sets, in mahogany cases. Dislocation apparatus, splints, &c.

Dentists' Instruments, including patterns of all the newest and most approved forceps, punches, scaling and stopping instruments, in handsome mahogany cases, as used by the most eminent dentists in London and the Provinces. Maw's new and improved dentists' drill, capable of being worked in any position.

Ear Instruments.—Hearing-trumpets, conversation-tubes, &c., &c.

Eye Instruments, complete set in case; also a new and elegant double-action Eye Douche, electro-plated, with glass reservoir, in morocco case; a most complete and valuable instrument.

Elastic Surgical Apparatus and appliances.

Enema Apparatus, brass and electro-plated, in mahogany and morocco cases; several specimens of the most approved kinds, both single and double action. Maw's new Enemas, with glass reservoirs, both single and double action.

Feeding Bottles for Infants. Maw's patent fountain, with German silver, electro-plated mounts, in cases, also in cheaper forms, sold at 2s. 6d. each and upwards. Maw's 1s. feeding-bottle, in case complete, and a variety of other patterns, with glass, metallic, and elastic tubes of the most modern and improved construction suitable for export.

Guillotine for the Tonsils (quite a new instrument).

Hernia instruments. Hydrocele instruments.

Inhalers, in Britannia-metal, glass, and earthenware.

A cheap earthenware inhaler, with a new patent application and valve, by S. Maw and Son.

Lithotomy instruments. Lithotritry instruments, complete sets in cases.

Lancet Cases, silver, handsome engine-turned, engraved and chased, specimens in all sizes.

Midwifery Instruments, a complete set, in chequered ivory handles and mahogany case.

Minor Operating Instruments, a complete set, in case.

Nipple Shield, of glass, with elastic tube and teat, a perfect little instrument, in box complete, retail price, 1s. 6d.; also a variety of india-rubber teats. Glass, metallic, and india-rubber shields.

Pessaries, an assortment of india-rubber, vulcanite, and boxwood; also a beautiful specimen in thin ivory.

Pill Machines, of superior make, with marble and mahogany slabs.

Pocket Instruments, several complete sets in elegant cases, mounted in handsome engine-turned gilt handles with fluted backs; also in tortoiseshell and ivory.

Respirators, Ethereon, plated with silver and gilt; also the Ethereon Scarf Respirator.

Scissors for surgeons' and druggists' use, in great variety.

Specula, an elegant assortment for the eye, ear, vagina, rectum and nose.

Stethoscopes, a variety of specimens, in ebony, ivory, cedar, &c.

Stomach-pump, in mahogany case.

Trephining Instruments, a full set in mahogany case; also Maw & Son's improved set, consisting of three Trephines, electro-plated, fitting into spring socket, and mounted in ivory.

Trusses, specimens of several kinds, improvements upon expired patents; also of the ordinary common and patent trusses, of superior make, for hospital and general use.

Urethra Instruments.—Full set of Wakley's dilating canulæ, with elastic and silver catheters, in case complete. A set of Brodie's silver catheters, in chequered ivory handles. A set of three prostate catheters, in chequered ivory handles.

Urinometers.—Urinals and uterine instruments.

Veterinary Instruments.—Complete sets of pocket and dissecting instruments, in cases; also Maw's improved veterinary enema and stomach-pump, in mahogany case.

[3554]

MOGGRIDGE & DAVIS, 18 *George Street, Hanover Square*.—Specimens in dentistry.

The PATENT PNEUMATIC PALATE, in gold, bone, and their celebrated flexible base.

Two heads illustrating the same face with and without teeth.

No. 1.—A set of mineral teeth on a flexible base, with artificial palate, cheek, shield, and uvula.

No. 2.—A set of mineral teeth on a flexible base, with an artificial palate, air chamber, and uvula.

No. 3.—A set of mineral teeth on gold plate and flexible gum.

No. 4.—A set of mineral tube teeth, with gold sockets inserted in a flexible base.

No. 5.—Specimens of mineral teeth on flexible bases, suited to various cases.

No. 6.—Two entire sets of natural teeth, socketed in a flexible base.

No. 7.—A gold articulating palate, with four mineral teeth set, and gold uvula.

No. 8.—Specimens of gold palates, with air chambers.

No. 9.—Various specimens of mineral teeth, set on gold plates.

No. 10.—Specimen of artificial teeth made from the hippopotamus' tusk.

No. 11.—A set of natural teeth on an hippopotamus palate.

No. 12.—A set of mineral teeth made in the seventeenth century.

[3555]

MORRISON, JAMES DARSIE, *Edinburgh*.—Dental appliances, processes, and products; safety couch for chloroform patients.

[3556]

MOSELEY & Co., Dentists, 30 *Berners Street, London, W.*—Different descriptions of artificial teeth and dental appliances.

[3557]

NORMAN, S., Jun., 1 *Cheltenham Place, Westminster Road, S.*—A lift for a short leg, and shell for boot: also a boot for a wooden leg.

[3559]

O'CONNELL, EDWARD, *Bury, Lancashire*.—Patent siphonia, or infant's feeding bottle; also for applying drinks to invalids and others. (*See page 127.*)

[3561]

PARSONS, JAMES, & Co., 15 *Manor Row, Bradford*.—Artificial teeth.

[3562]

PATRICK, HUGH W., 18 *Broad Street, Golden Square, W.*—Artificial palates, block and single teeth, continuous gum work; dental application of artificial ivory, coral, vulcanite, and materials in the process.

[3563]

PAUL, ANDREW, Surgeon, 27 *Mecklenburgh Square*.—Douche bath (two models), applicable in diseases requiring aspersion or percussion with water.

[3564]

PEARCE, WILLIAM, & Co., *Bridge Street, Bristol; and Brooke Street, Holborn, London*.—Surgical appliances.

PEARCE & Co.'s newly invented Truss for Hernia, is so constructed that the pressure may be increased or decreased as required, and the necessity of an under-strap is obviated. An elastic spring is introduced at the back, which yields to the motion of the body, thereby rendering the truss easy and comfortable to wear.

PEARCE & Co. are manufacturers of spine supports, umbilical belts, abdominal belts, artificial legs, &c.

PEARCE & Co.'s Improved Stethoscope consists of various kinds of wood, so joined as to render it a good conductor of sound, and making it considerably stronger and much less liable to break than the ordinary wooden ones.

[3565]

PINDAR, CHARLES, Maker and Inventor, 19 *John Street, Holland Street, Blackfriars Road*.—Pill and press, tincture press, pill machine, plaster machine, &c.

[3566]

POLLARD, CHARLES & EDWARD, *Brompton Turkish Baths, Alfred Place, Thurloe Square*.—Turkish bath, gout, invalid, and bathing sandal.

O'CONNELL, EDWARD, *Bury, Lancashire*.—Patent siphonia, or infant's feeding bottle; also for applying drinks to invalids and others.



The great facility and comfort afforded by this truly valuable invention in the rearing of infants, has elicited from parents of all classes the warmest expressions of their approval and gratitude to the original inventor of so great a boon.



No other contrivance for a similar purpose has ever before been so highly recommended by the Medical Profession, ladies of distinction, and others who have patronized its use, as this universal favourite of mothers and babes.

To mothers who, from delicacy of constitution or other causes, are unable to nurse their own infants, and who dislike the aid of "wet-nursing," the Siphonia affords the greatest assistance, by enabling them to bring up their little ones under their

own care in a very healthy manner.

Nothing can be more convincing of the valuable nature of this invention, and of its near approach to the principle of the natural breast itself, than the great number of fine healthy children who have been brought up from birth on its use. There are thousands of parents throughout the country who can bear willing testimony to the truth of this statement.

It is indeed gratifying to the inventor of the Siphonia to know that his humble efforts in endeavouring to supply a want, previously felt in many families, have been so highly appreciated by parents of all classes, from the occupant of the palace to that of the humble cottage.

The inventor of the Siphonia feels it unnecessary to quote any of the numerous letters received from medical men, who have been satisfied as to the merits of the invention, and who invariably recommend it to their patients whenever such aid is required.

Fitted up in plain and elegant styles, with new patent improvements, to suit the taste and means of all classes. Price 21s., 10s. 6d., 5s., and 2s. 6d. May be had of the Inventor and Patentee, or through any of his agents.

N.B.—The Siphonia Nursery Lamp is included with the Guinea Box. Price separately, 5s. 6d.

Improved Night Lamp for the sick-room, with means for giving drink to invalids without having to be raised up in bed. Price 3s. 6d. and 5s. 6d.

The Biberon, a new patent invention, adapted for a lady's travelling companion. Price 2s. 6d. plain; in neat style, 3s. 6d.

Among the many who have borne testimony to its value, the following distinguished persons have permitted the inventor of the Siphonia to make use of any extracts from their letters to him expressive of their high opinion of his useful invention:—

The Countess of Hopetoun will gladly give Mr. O'Connell permission to quote from her letters of last month, or from this one, if he prefers it:—She has experienced still greater comfort and satisfaction from his clever invention since she last wrote, as she has been ill and unable to nurse her little baby, who has consequently lived upon his Siphonia bottle and has never given an hour's trouble or suffered from the change in the least. She cannot, therefore, sufficiently praise and recommend Mr. O'Connell's valuable and beautiful arrangement.—Lubenham Hall, Rugby, March, 1861.

Lady Middleton begs Mr. O'Connell will make use of her letter if it will be of any advantage to him. The Siphonia is most certainly a great boon, as her own baby is thriving well on its use. Lady Middleton takes every opportunity of recommending the Siphonia to other ladies, having herself found it so useful.—Birdsall Hall, Malton, Yorkshire, February 22, 1861.

Lady Burrard will with pleasure grant Mr. O'Connell permission to add her name to the list of ladies who have experienced the comfort afforded by his charming Siphonia. She has already frequently recommended the Siphonia among her friends.—The Mount, Yarmouth, April 21, 1861.

The Hon. Mrs. Ryder, of Sendon Hall, Stone, Staffordshire, will be very happy for Mr. O'Connell to make any use he pleases of her name, being glad to bear testimony to the great value of his excellent invention the Siphonia, which has been of the greatest service to her baby.—39 Grosvenor Square, London, May 25, 1861.

Thurlam Castle, Kirby Lonsdale, Feb. 8, 1861.

Mrs. North Burton will feel obliged by Mr. O'Connell sending two of his Patent Siphonias as soon as possible, which she requires for lending amongst the villagers. Mrs. North Burton considers Mr. O'Connell's invention a most invaluable one, having found it to answer so admirably with her own little babe, that she takes every opportunity of recommending it to others.

Crowsley Park, Henley-on-Thames,
June 20, 1862.

Sir,

The Siphonia which you sent me some time ago came to hand, and I am quite charmed with it, it answers the purpose so admirably. I shall have much pleasure in recommending it to my friends. I feel quite indebted to Mrs. North Burton (my sister-in-law) for mentioning the Siphonia to me.

I remain, sir, yours faithfully,

Mr. Edward O'Connell. M. A. BASKERVILLE.

Godmersham Vicarage, Canterbury, July 20.

Mrs. Gale has much pleasure in informing Mr. O'Connell that she has experienced the greatest comfort from the use of his Siphonia, which she takes every opportunity of recommending amongst her friends. Mrs. Gale has been truly interested in a case where an infant has been deprived of the blessing of a mother. It is now being brought up entirely on the use of the Siphonia, and a more lovely or healthy child of three months old cannot be seen.

Masham, Yorkshire, January 28, 1862.

Dear Sir,

In reply to your letter duly received, I beg to assure you that I can never say too much in praise of your very happy invention. I am glad to say that my baby continues the picture of health and happiness, all of which I attribute to the use of your Siphonia.

Believe me yours sincerely,
MARGARET J. FISHER

[3567]

POWELL, SAMUEL, 2 *Surrey Cottages, Surrey Grove, Old Kent Road, S.*—Breast drawers, glass syringes, tube bottles, &c.

[3568]

PRATT, JOSEPH FRANCIS, 420 *Oxford Street, W.*—Apparatus for various deformities, and surgical instruments.

[3569]

PUCKRIDGE, F. L., 4 *York Place, Walworth.*—Liston's membrane plaster, court plasters, and gold-beaters' skins.

[3570]

PULVERMACHER, T. L., 73 *Oxford Street.*—Patent galvano-piline, a flexible galvanic constant battery for medical use, &c. (*See page 129.*)

[3571]

REDFORD, GEORGE, M.R.C.S. (late Army Medical Staff), *Cricklewood.*—1. Portable stretcher in halves fitting universally. 2. Medicine pouch.

[3572]

REIN, FREDERICK CHARLES, 108 *Strand, London.*—Surgical instruments, and acoustic appliances.

[3573]

REIN, MRS. S., 108 *Strand, London.*—On a new principle elastic abdominal supports; improved elastic stockings, knee-caps, and every support for the human body.

[3574]

REYNOLDS, JOHN, 20 *St. Anne Street, Liverpool.*—Artificial leg, with improved knee-joint and springs; trusses for hernia, and appliances for deformity.

[3575]

RIMMEL, EUGENE, 96 *Strand.*—Patent aromatic disinfecter, for destroying all bad smells and purifying the air in hospital wards, dissecting rooms, dead-houses, coroners' inquests, sick-rooms, lodging-houses, ships, steamers, &c. (*See page 130.*)

[3576]

ROGERS, CHARLES, Inventor, 40 *Great Tindell Street, Birmingham.*—Either side double lever truss for single or compound hernia.

[3577]

ROGERS, MAURICE, 18 *New Burlington Street, W.*—Specimens of artificial teeth.

[3578]

ROOFF, WILLIAM B., 7 *Willow Walk, Kentish Town.*—Respirators, acoustic and medical instruments; patent safety seat.

Respirators in gold, silver, plated metal, charcoal, and aluminium. The excellence of these patent respirators is attested by the very large demand for them. Each is stamped with the maker's name.

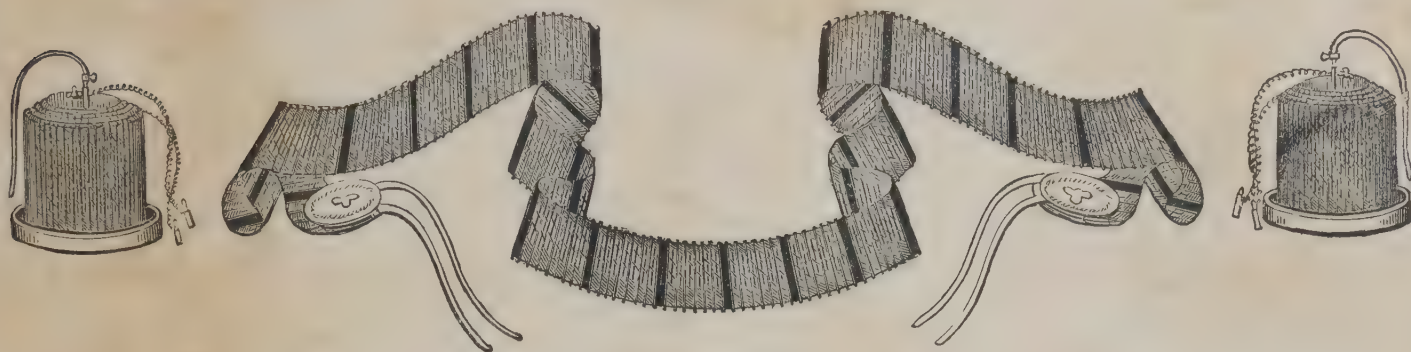
Rooff's Patent Inhaler permits easy respiration, and prevents the expelled breath contaminating the incoming vapour.

Rooff's Patent Tympani, or invisible sound-magnifier, has proved of great service to numbers affected with deafness.

Rooff's Patent Lavement apparatus is widely patronized on account of its great convenience and lightness.

These goods are sold by all chemists; descriptive catalogues may be obtained from the manufacturer, post free.

PULVERMACHER, J. L., 73 *Oxford Street*.—Patent galvano-piline, a flexible constant battery for medical use, &c.



PULVERMACHER'S PATENT GALVANO-PILINE (for Medico-galvanic purposes) is a fabric composed of galvanic metal wires and a fibrous texture, representing a diminutive voltaic battery described in page 26, Class XIII. It possesses the same properties and advantages there enumerated, which, combined with its extreme pliability and durability, admirably adapt it for every imaginable mode of physiological experiment, or medical application of *intermittent* or *continuous* currents. A momentary, prolonged, localised, or diffused action can be administered by it with equal ease and comfort.

According to the mode of application required, the Galvano-piline is arranged, firstly, as a diminutive self-supplying pocket battery, for momentary operations. Secondly, in the form of bands, belts, necklaces, &c., for the prolonged application of diffused and gentle currents. These are easily worn on the part affected; infusing into the system a steady supply of gentle galvanic currents, analogous to the physiological functions of the animal economy. These batteries can be seen in operation at MESSRS. J. L. PULVERMACHER & Co.'s (Galvanic Establishment), 73 *Oxford Street*, London, adjoining the Princess's Theatre.

PRICE LIST.

FLEXIBLE BATTERIES, manufactured from the Galvano-Piline, for the instantaneous generation of volta-electric currents of intensity, to be charged with the exciting liquid simply by immersion.

GALVANO PILINE battery of 50 elements, each element, 2 square inches in surface, complete	£ s. d.
Ditto, ditto, of 100 elements, each element 2 square inches in surface, complete.	1 10 0
Ditto, ditto, of 100 elements, each element 6 square inches in surface, complete	2 10 0
Ditto, ditto, of 100 elements, each element 13 square inches in surface, complete	3 10 0
	6 10 0

Galvano-Piline batteries can be made to order for intensive or quantitive electricity, with any number and size of elements required. Batteries can be made of zinc and silver, or zinc and platinum, platinized for obtaining a double effect with the same surface.

GALVANO-PILINE DIMINUTIVE BATTERIES for the prolonged and steady application of moderate continuous currents in form of chain-bands to be worn on the body, to be charged with the exciting liquid simply by immersion.

No. 0, narrow, full electric power, 36 inches long, applicable for the limbs	£ s. d.
No. 1, narrow, less power, 33 inches long, applicable for the limbs and stomach	1 2 0
No. 2, narrow, medium power, 24 inches long applicable for the stomach, head and face	0 18 0
No. 3, narrow, weak power, 16 inches long, applicable for the head and face	0 15 0
No. 4, narrow, weakest power, 8 inches long, applicable for the head and face	0 10 6
No. 0, broad, full power, 25 inches long, spinal band	0 5 0
No. 1, broad, less power, 21 inches long, applicable for the loins, spine, and stomach	1 2 0
	0 18 0

No. 2, broad, medium power, 16½ inches long, applicable for the abdomen, head and face	£ s. d.
No. 3, broad, less power, 12 inches long, applicable for the knee joints, and head	0 15 0
No. 4, broad, weak power, 6 inches long, short band, bracelet	0 10 6
Combined bands for acting upon the spinal column, limbs, &c., simultaneously	0 5 0
	2 0 0

GALVANO-PILINE DIMINUTIVE FLEXIBLE BATTERIES for the prolonged and steady application of moderate continuous currents in form of chain bands, to be worn on the body, charged with the exciting fluid by a self-supplying arrangement.

No. 0, narrow, full electric power, 36 inches long, applicable for the limbs	£ s. d.
No. 1, narrow, less power, 30 inches long, applicable for the limbs and stomach	1 13 0
No. 2, narrow, medium power, 24 inches long, applicable for the abdomen, head and face	1 7 0
No. 3, narrow, weak power, 16 inches long, applicable for the head and face	1 2 6
No. 4, narrow, weakest power, 8 inches long, applicable for the head and face	0 15 0
No. 0, broad, full power, 25 inches long, spinal band	0 7 6
No. 1, broad, less power, 21 inches long, applicable for the loins, spine, and stomach	1 13 0
No. 2, broad, medium power, 16½ inches long, applicable for the abdomen, head and face	1 7 0
No. 3, broad, less power, 12 inches long, applicable for the knee-joints or head	1 2 6
No. 4, broad, weak power, 6 inches long, short band, bracelet	0 15 0
	0 7 6

GALVANO-PILINE DIMINUTIVE BATTERY (self-supplying arrangement), in the form of a belt, 3 inches wide, complete with conducting wires, pole, plates, &c.

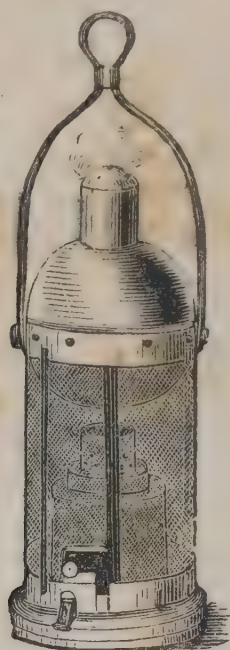
ACCESSORIES required in different modes of application of galvanic intermittent and continuous currents.

VIBRATING INTERRUPTER to produce muscular contractions	£ s. d.
Interrupting conductors	0 2 0
Interrupting clockwork	0 3 0
Galvanizing cylinders with insulating handles, per pair	1 10 0
Electro conducting spongeo-piline, per square inch	0 3 6
Electro conducting caps	0 1 3
Electro conducting brushes, according to size, from 15s. to	1 10 0
Electro conducting pessaries	0 15 0
Electro conducting ear-sponges	0 1 0
Electro conducting catheters	0 4 0
Electro conducting tooth-brushes, from 1s. to	0 5 0
Electro conducting bathing-drawers	1 10 0
Electro conducting suspenders	0 15 0
Graduated voltameter, for measuring the degree of power of the galvanic current	0 5 6
Water decomposing apparatus, from 1s. to	0 3 6
Pocket galvanometer	1 1 0
Flexible conducting wires, per pair	0 2 6
Electro physiological forceps	0 10 0

RIMMEL, EUGENE, 96 *Strand*.—Patent aromatic disinfectant, for destroying all bad smells and purifying the air in hospital wards, dissecting rooms, dead-houses, coroners' inquests, sick-rooms, lodging-houses, ships, steamers, &c.



For Hospital Wards, Dissecting Rooms, &c.
Price 4s. 6d. & 10s. 6d.



For Ships and Steamers, with safety lamps and hanging gear.
Price £1 1s. & £1 10s.



For Household use and Sick Rooms.
Price 1s. 6d.

Pocket cases for medical men, or persons visiting the sick, 11. 1s. Aromatic Compound to be used in the disinfectant, in small bottles for household use, 1s. ; in large quantities, 16s. per lb.

RIMMEL's Aromatic Disinfectant acts on the same principle as his Perfume Vaporizer exhibited in Class 4, and well known in fashionable circles, but it is of a more simple and economical form, and is confined to sanitary purposes. The aromatic compound prepared for it is not extracted from flowers, as that used in the Vaporizer, but from plants noted for their beneficial and prophylactic actions—such as rosemary, thyme, &c. It is therefore incapable of affecting the most nervous invalid, or of proving unpleasant even to those most averse to perfume.

It removes instantaneously all sorts of bad smells, whatever may be their nature or intensity, and substitutes a reviving and grateful atmosphere. The potency and rapidity of this system may be judged from the fact that it only takes five minutes to saturate an immense area like that of Covent Garden Theatre with fragrant vapours.

The apparatus and *modus operandi* are both very simple. The former consists in a pan heated with an oil lamp, and half filled with hot water, into which a few drops of the compound are poured; the effect is produced as soon as the water commences to boil.

Some scientific men are of opinion that aromas are not positive disinfectants, but merely cover one smell by means of another. It may be said in reply to this, that many noxious effluvia have hitherto resisted all attempts at analyzation, and that it has likewise been found impossible to ascertain the true nature of fragrant volatile emanations, their solid basis only being known; and in such a case we may admit the evidence of our senses for want of better tests, and if we find a bad smell replaced entirely by a pleasant one, we may fairly assume that the former has become neutralized. In fact, E. RIMMEL has

had positive proofs of his apparatus answering when all other disinfectants had failed, which is probably to be attributed to the penetrating influence of fragrant molecules, developed *ad infinitum* by means of steam, and perhaps also to their ozonizing or oxygenating properties. Those aromatic fumigations have even been tried and found to succeed in arresting the progress of infectious diseases, and some very interesting experiments might be made in that way by medical practitioners.

RIMMEL's Disinfectant has been adopted by the Royal College of Surgeons for their dissection meetings, and by many of the London hospitals to be used in the wards. It has also been tried successfully at the Amphithéâtre de Clamart in Paris, and at the principal hospitals in Vienna. It was introduced on board of Her Majesty's Steam Yacht, the Victoria and Albert, to remove the nauseous smell proceeding from the engines, and is now in use on some of the Peninsular and Oriental Company's vessels, and other steamers, where it is found most useful and agreeable to the passengers, producing a reviving atmosphere, and allaying the sufferings of sea sickness.

E. RIMMEL will be happy to present gratuitously any hospital or charitable institution with his apparatus and the necessary compound. He hopes that in return medical men when quite convinced of its efficacy in the sick-room, will do him the favour of recommending it to their patients.

N.B.—E. RIMMEL has received many letters from eminent scientific men bearing testimony to the useful qualities of his Disinfectant, and is ready to show them privately to any members of the profession who may favour him with a call at No. 96 Strand.

EUGENE RIMMEL, Inventor and Patentee of the Aromatic Disinfectant, and Perfume Vaporizer, 96 Strand, and 24 Cornhill, London.

[3579]

RUSSELL, CAPTAIN GODFREY, *Swan Hill, Shrewsbury*.—Improved hospital bed appliance; ditto hospital stretcher; camp hospital spring-bed or stretcher; incontinent urinal.

IMPROVED HOSPITAL BED APPLIANCE.—This model of the pattern in the Tower is shown by the kind permission of the Hon. Secretary for War, with the hope that its use may become more general, and that by thus giving it for the public benefit, and inviting competition, it may be still improved and the cost of its construction reduced. It has been in constant beneficial use in two of Her Majesty's military hospitals for more than twelve months; has undergone every test and examination by numerous boards of the highest medical authority; and has been found of great service to the medical profession in diseases and injuries of the hip joint, pelvis, spine, and all extreme cases in which absolute rest is required. Long trial has shown that by preventing painful movements, the patient is saved a good deal of exhaustion; and it may be added that a single nurse has full control over the invalid. It was given to the army and navy.

IMPROVED HOSPITAL STRETCHER.—Accepted by Her Majesty's Service, and is shown and given to the public on the same authority and grounds as the improved bed appliance. The chief object is to remove patients to and

from the operating-room, or extreme cases, as it can be removed without their feeling any motion.

RUSSELL'S CAMP HOSPITAL SPRING BED OR DHOOLEE STRETCHER.—This forms a very comfortable bed, and being on springs, prevents any shock on changing bearers. It has a sun and rain-awning, and packs up in a small compass. It was expressly made for Her Majesty's Service, has undergone examinations, and a certain number sent to the camps; but circumstances have compelled the inventor, unwillingly, to seek protection by patent. He considers that the commoner form would be of great service at hospitals and railway stations, for the easy conveyance of injured persons.

INCONTINENT URINAL, for day and night use, expressly made for Her Majesty's hospitals and invalid depôts. Considering the great importance of appliances of this kind, the inventor has shown it in order that it may be more generally adopted and improved. Many experiments have been made, by an eminent Professor of chemistry, to test the material, and that manufactured by the successors to Charles Goodyear, 11A Adam Street, Adelphi, has been found to be superior.

[3580]

SANSOM, DR. A. E., M.B., *Ashburton Villa, Lower Road, Islington*.—Apparatus for the gradual administration of chloroform.

[3581]

SAVORY & MOORE, 143 *New Bond Street*.—Portable medicine chests, &c. (*See page 132.*)

[3583]

SILLIS, FRANCIS, 2 *George Street, Euston Square, London*.—Artificial legs, hands and arms, spring crutches, and hand instruments.

[3584]

SIMPSON, HENRY, 55 *Strand, London*.—Surgical instruments (various).

[3585]

SMALE BROTHERS, 19 *Great Marlborough Street, London*.—Mineral teeth, dental implements, and appliances.

[3586]

SMITH, JOHN COX, *Week Street, Maidstone*.—Tooth instruments for the especial use of army and navy surgery.

[3587]

SMITH, WILLIAM & FRANCIS, 253 *Tottenham Court Road, London*.—Water bed, or floating mattress for invalids.

[3588]

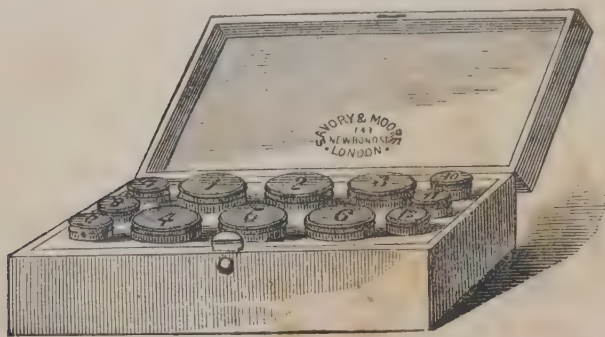
SPARKS & SONS, 28 *Conduit Street, Hanover Square, W.*—Surgical bandages and appliances for the relief and cure of deformities, and giving support to the human frame.

[3589]

SPRATT, WILLIAM HENRY, 2 *Brook Street, Hanover Square, W.*—A collection of trusses and orthopædic instruments.

SAVORY AND MOORE, 143 *New Bond Street*.—Portable medicine chests, &c.

TOURISTS' AND SPECIAL CORRESPONDENTS' PORTABLE MEDICAL CASE.



Messrs. SAVORY & MOORE, of New Bond Street, exhibit a very complete collection of Medicine Chests, from the large box, adapted to the use of a detachment on active service, to the small, but no less efficient pocket case, that may be conveniently packed in the portmanteau of a tourist, or even conveyed in the coat-pocket in case of emergency.

These latter small travelling Medicine Chests are novel in their design, and compact in their arrangement. A strong leather case, six inches by nine, and only two and a half in thickness (in fact of the form and size of an ordinary octavo volume, and opening in much the same manner), contains a pair of scales, with the necessary weights, a small glass measure, eight small bottles adapted to receive either powders or pills, eight of larger size, stoppered for liquids, and two still larger for holding any medicines required in greater bulk. This little case, which would scarcely take up any appreciable room in the travelling bag, will contain all the Medicines required in any case of emergency. Its value to a party of tourists, or to a single traveller, removed from medical aid, can hardly be overrated. The "Special Correspondents" of our daily papers have used these cases in nearly every quarter of the globe, and have spoken most highly of their utility.

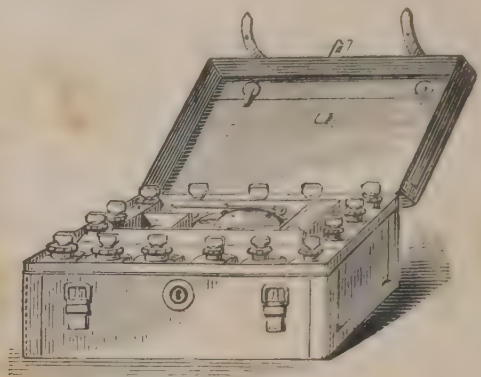
Larger Leather Cases, of the same character, containing a greater number of remedies, are also shown by the firm.

THE YACHT MEDICINE CHEST, as its title implies, is adapted for use in short sea voyages. It contains sufficient medicine for a crew of twenty persons, and in addition a few surgical appliances that may be required in an emergency, such as splints and bandages for fractures.

The most important articles exhibited by Messrs. SAVORY & MOORE are unquestionably those valuable aids to military surgery which they have put together. Under the title of a MEDICAL FIELD COMPANION, SAVORY & MOORE have designed a case, weighing only ten pounds, to be carried on the march by a soldier in lieu of his rifle. This Companion contains all that could be required during a reconnaissance; such as mixture for diarrhoea, tincture of opium, chloroform, sal volatile, also packets of powder most likely to be useful in an emergency in their proper doses; several varieties of pills, and all the appliances likely to be required, as lint, bandages, plasters, splints, sheeting, tourniquet, &c., &c.

The IMPROVED MEDICAL PANNIERS, for the use of the army, are designed to convey all the appliances, both medical and surgical, that may be required by a regiment in the field and during a march. Within the compass of two panniers of ordinary size, and the regulation weight, are contained, on the one side, some thirty different drugs, with all the required accessories of scales, weights, &c., each so accessible as to be obtained in a moment; medical comforts for the sick and wounded, such as brandy, concentrated beef tea, arrowroot, &c.; a lamp with reflector and such adjustment as enables it to be used in warming a small quantity of food. In the other pannier may be found the case of operating instruments, tourniquets of different kinds for field use,

THE OFFICER'S MEDICINE CHEST USED IN THE CRIMEA, INDIA, AND CHINA.



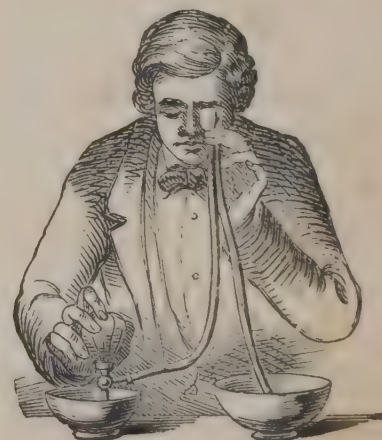
bandages, plasters, sheeting, splints, and everything to hand.

The panniers may be used on or off the mule's back, and are so constructed that they can be made to form a very good and firm operating table, by placing them on the ground, throwing open the lids, and securing them in the required position. The advantage of this arrangement, when the surgeon is in the open field, far from houses, is obviously very great.

THE ARMY DETACHMENT MEDICINE CHEST is a strongly-bound polished oak box, containing, in the compass of a few feet, a larger and more complete assortment of medicines and materials than would be found in most ordinary surgeries.

This Military Chest is so constructed that, by merely opening the lid, a dispensing counter of convenient height is at once formed; and, without shifting his position, the dispenser will find everything at hand, the whole being so admirably arranged that no one article has to be displaced to gain access to another.

In addition to these valuable aids to Military Surgery, Messrs. SAVORY & MOORE also exhibit EYE and EAR DOUCHES of improved construction. The great peculiarity of these instruments is that, in addition to the elastic bottle and tube conveying the stream of liquid to the eye or ear, there is a second tube from the glass



cup, which is placed against the affected organ; this tube conveys away the water into a basin, and so prevents it running down the face or neck, to the great discomfort of the patient.

The ENEMAS shown by the same firm are supplied with an elastic tube in the place of the usual inflexible bone or metallic nozzle. This affords very great facility for introduction into the bowel, and removes all risk of lacerating the lining membrane. As thus fitted, these instruments are especially adapted for the self-administration of injections, which are so valuable in the removal of habitual costiveness, without the necessity of continually having recourse to aperient medicines.

[3590]

SYKES, MARY EFLAT, 280 *Regent Street, Castle Square, Brighton*.—Corsets for pregnancy, and an abdominal bandage for after accouchement.

[3591]

THRING, CHARLES, 3 *Little Randolph Street, Camden Town*.—Inodorous commode for the sick chamber; cheap arm-sling.

[3592]

TOMPSON, W. A., 18 *Cecil Street, Strand*.—Inhaler for applying caustic solution internally in throat diseases.

[3593]

TUFNELL, JOLIFFE, *Mount Street, Dublin*.—Tubular bougies for the cure of stricture of the rectum.

[3594]

TWEEDIE, WILLIAM, 337, *Strand, London*.—The respirator, composed of ten layers of gold wire—a perfect instrument. (*See page 134.*)

[3595]

WAITE, GEORGE, 2 *Old Burlington Street*.—Surgical instruments.

[3596]

WALTERS, FREDERICK, 16 *Moorgate Street, City*.—Surgical instruments, and instruments for deformities.

[3597]

WEEDON, T., Surgeons' Instrument Maker, *Hart Street, Bloomsbury, London*.—Instruments for microscopical preparations, morbid anatomy, and animal preserving.

[3598]

WEISS, J., & SON, 62 *Strand*.—Variety of surgical instruments.

[3599]

WELLS, GEORGE S., 59 *Euston Square*.—Artificial teeth and gums.

[3600]

WELTON, THOMAS, 13 *Grafton Street, Fitzroy Square*.—A case with jointed pin-leg, artificial human leg, and others.

[3601]

WELTON & MONCKTON, 13 *Grafton Street, Fitzroy Square*.—A magnetic chain and battery for curing diseases.

[3602]

WESTBURY, ROBERT, 26 *Old Millgate, Manchester*.—Trusses and deformity instruments.

The following truss and deformity instruments are exhibited:—

No. 1. Instrument for correcting lateral curvature and torsion of spine; with eight distinct movements for adjustment.

No. 2. Instrument for a case of disease of upper cervical vertibræ close to the occiput; with seven movements for adjustment.

No. 3. Apparatus for remedying permanent contraction of fingers, after burns or other injuries. Cast No. 1 shows such a case previous to the use of this instrument, and Cast No. 2 the same after three months' treatment.

No. 4. Instrument for talipes, *equino varus*, or club foot. Case No. 3 represents such a case as the instrument is adapted for; with special arrangement for rack

and pinion, and rotatory movements in the sole of the shoe.

No. 5. Truss with concave pad, for a case of irreducible femoral hernia.

No. 6. Truss with coil-spring pads, for a case of double inguinal hernia.

No. 7. Frame-work, showing construction of imperceptible curative truss; with rotatory movement for adjusting the pad.

No. 8. Truss for umbilical hernia.

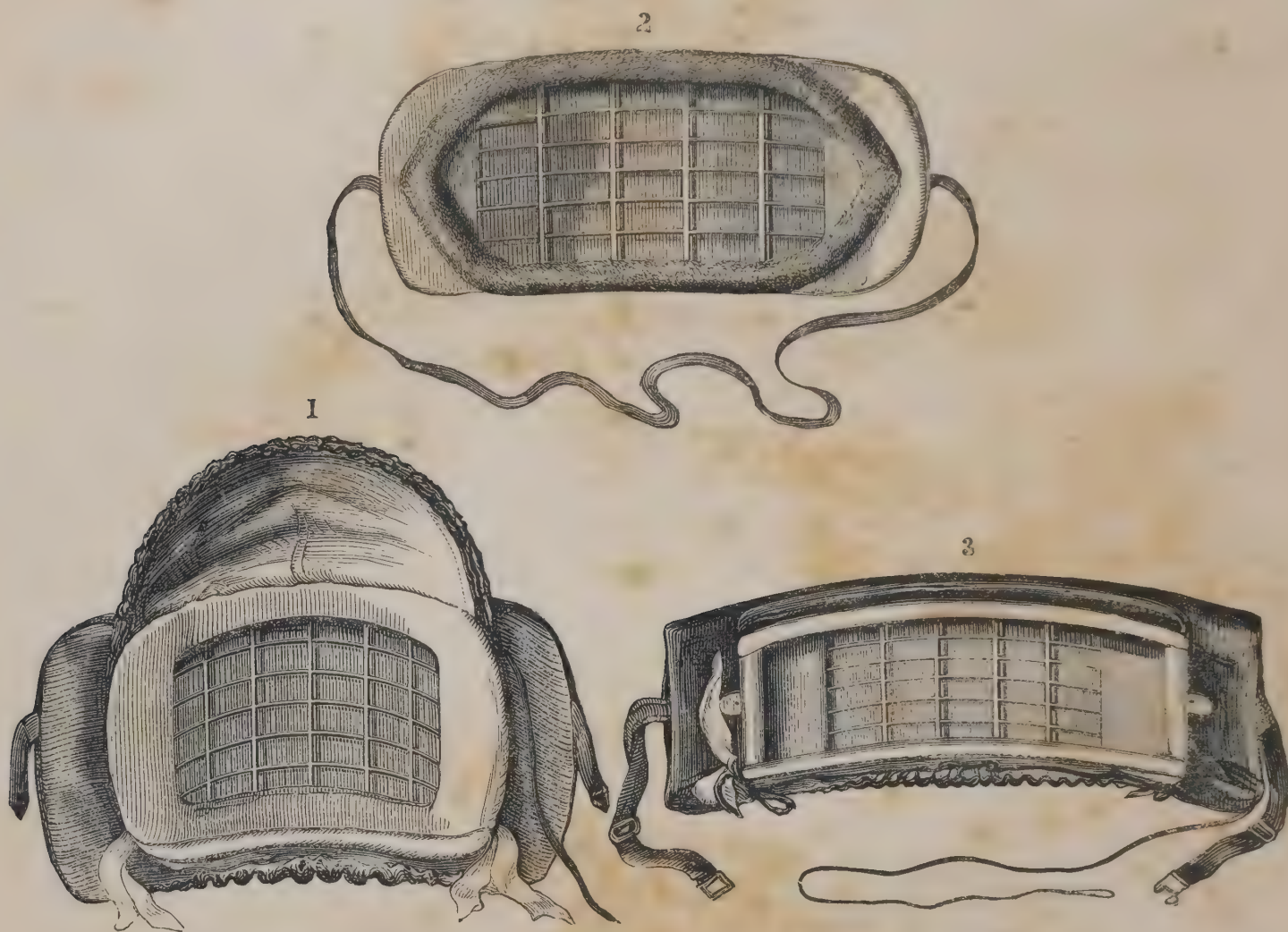
No. 9. Children's trusses, single and double.

No. 10. Spinal support, for cases of slight curvature.

No. 11. Steel stays, used as a preventative in case of tendency to curvature of the spine.

Nos. 12 & 13. Instrument for genu-valgum, or knock-knees; with improvements.

TWEEDIE, WILLIAM, 337 Strand, London.—The respirator, composed of ten layers of gold wire—a perfect instrument.



THE RESPIRATOR.

The word "RESPIRATOR" was introduced into the language twenty-six years ago by MR. JULIUS JEFFREYS, F.R.S., shortly after his retirement from the Indian Medical Staff. This word was chosen as an appropriate name to designate an instrument of a peculiar and elaborate metallic construction, which, when *respired* through (*i. e.*, breathed through both ways in drawing and expelling breath), should have the property of promoting a free and easy respiration, by transferring warmth and moisture from each outgoing breath (the impure gases of the breath being freely voided) and imparting that warmth and moisture to each fresh-entering breath—thereby rendering it genial and soothing to irritable breath-passages.

Thus may be produced a climate for the lungs, variable at will, and fulfilling many important pathological purposes which cannot be here enumerated.

But the name RESPIRATOR has been so prostituted by its assumption for articles bearing an outward appear-

ance to the true instruments (as a toy-watch may to the real one), that Mr. Jeffreys is very doubtful if any public object can be served by this occupying of space in the International Exhibition Catalogue with mere sketches of the different forms of the true Respirator. Figs. 1, 2, and 3 refer severally to the orinasal respirator for the mouth and nostrils, and to the dwarf (which will henceforth be discontinued) and the standard oral Respirator, instruments for the mouth alone. Besides these, there are the Nasal, an instrument for the nose only, and the Hand Respirator—held in the hand and applied to the mouth or nose according to the make of the instrument.

It is these instruments which have acquired for the name RESPIRATOR its world-wide reputation by the benefits they have conferred upon a multitude of sufferers from all varieties of pulmonary disorder—benefits which they who have recourse to trashy articles in lieu of the true instruments will never experience.

[3603]

WETHERFIELD, JOHN, *Henrietta Street, Covent Garden*.—Amadou plaster—a surgical appliance for purposes of support and defence.

[3604]

WHIBLEY, EBENEZER, 41 *Radnor Street, Chelsea*.—Surgical operating table.

[3605]

WHICKER & BLAISE (late SAVIGNY & Co.), 67 *St. James's Street, S.W.*—Surgical instruments and appliances.

[3606]

WHITE, JOHN, 228 *Piccadilly*.—White's moc-main patent lever truss; elastic surgical appliances for hernia; new patent elastic stockings.

WHITE'S MOC-MAIN PATENT LEVER TRUSS and elastic surgical appliances for hernia; new patent elastic stockings, spinal machines, spinal corsets, chest expanders, ladies and gentlemen's belts, spring trusses with spiral springs and ivory pads, improved prolapsus ani.

White's Moc-main Patent Lever Truss is allowed by

500 medical men to be the best for hernia. It consists of an elastic pad, with a lever, and instead of the usual spring, a soft band, fitting so closely as to avoid detection. A descriptive circular may be had by post.

Single, 16s., 21s., 26s. 6d., & 31s. 6d.; postage, 1s. Double, 31s. 6d., 42s., & 52s. 6d.; postage, 1s. 8d.

[3607]

WHITING, WILLIAM, & SONS, *High Street, Camden Town*.—Improved spinal supports for lateral and angular curvatures.

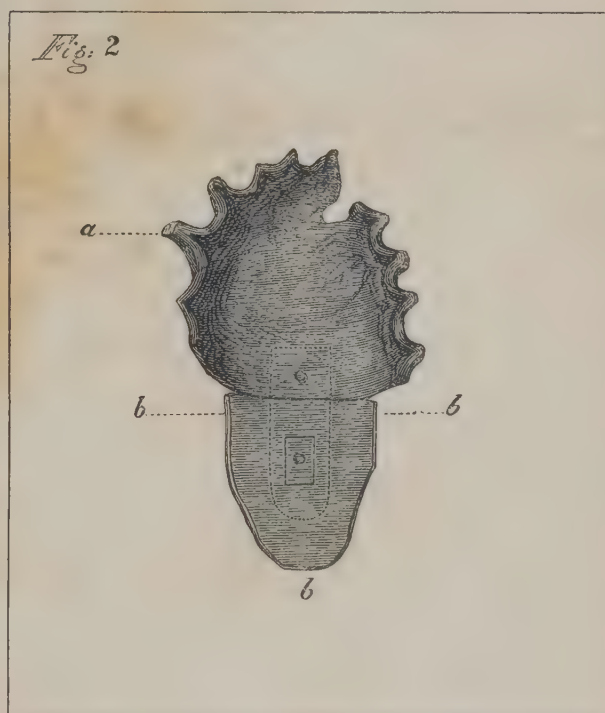
[3608]

WILLIAMS, G. J., 17 *Cavendish Place, Cavendish Square, W.*—Improvements in artificial palates and teeth.



Fig 1. Case of complete fissure of the hard and soft palate, the fissure extending through the whole of the hard palate and uvula.

Fig. 2. Represents one of Mr. G. J. Williams's improved Obturators for the above case. The portion *a*, which covers the palate as far as the second molar teeth, is constructed of hard vulcanite; the velum, or soft



palate, *bbb*, is formed in soft vulcanite, the two portions being united by a narrow band of elastic gold, allows the artificial velum to follow the muscular action of the palate, by which means the patient can perform the acts of deglutition and articulation with comparative ease.

[3609]

WOOD, WILLIAM ROBERT, Dentist, *Carlisle House, Brighton*.—Models presenting irregularities of teeth, and their cure; also general dentistry.

Specimens exhibiting certain means and processes employed in general dentistry, regard being had, in practice, to apply peculiar treatment to individual states of the

mouth. Models of nine mouths, illustrating irregularities of teeth, with the conditions and results of REGULATION.

[3610]

WRIGHT, Dr. HENRY G., 23 *Somerset Street, Portman Square*.—A substitute for the strait-waistcoat.

[3611]

YOUNG, JAMES ANDERSON, 47 *Bath Street, Glasgow, Scotland*.—Patent dental forceps, &c.

[3612]

READ, MESSRS., 8 *Holles Street, Cavendish Square*.—Artificial teeth.



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